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Technical Bulletin 1986-4E

The T.M.E. system of feed evaluation: methodology, feed composition data and bibliography

86-03879/

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The year 1986 is the centennial of the Research Branch, Agriculture Canada.

On 2 June 1886, *The Experimental Farm Station Act* received Royal Assent. The passage of this legislation marked the creation of the first five experimental farms located at Nappan, Nova Scotia; Ottawa, Ontario; Brandon, Manitoba; Indian Head, Saskatchewan (then called the North-West Territories); and Agassiz, British Columbia. From this beginning has grown the current system of over forty research establishments that stretch from St. John's West, Newfoundland, to Saanichton, British Columbia.

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The T.M.E. system of feed evaluation: methodology, feed composition data and bibliography

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Animal Research Centre Contribution 85-19

Research Branch
Agriculture Canada
1986

Copies of this publication are available from:
Director
Animal Research Centre
Research Branch, Agriculture Canada
Ottawa, Ontario
K1A 0C6

Produced by Research Program Service

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Cat. No. A54-8/1986-4E
ISBN 0-662-14628-X

SUMMARY

The true metabolizable energy (TME) system of feed evaluation comprises assays for bioavailable energy, amino acids, lipids and minerals. In this Bulletin the principles of the system are explained in the 'Introduction' which includes a diagram showing the partition of energy within the bird. A section entitled 'Bioassay Procedures' describes the basic methodology while sub-sections contain: a list of precautions to be observed when using the assays; a detailed description of the precision-feeding technique; details of the design and construction of cages for adult cockerels; and a discussion of excreta collection techniques. The section on 'Feedingstuff Composition' contains data describing the nitrogen, ether extract, crude fibre, neutral detergent fibre, ash, calcium, phosphorus, gross energy, TME, TME corrected to zero nitrogen balance (TME_n), total amino acids, and true available amino acids (TAAA) of an array of feed ingredients; the data are expressed per unit of dry matter. An important component of the Bulletin is the 'Bibliography' which lists references to more than 500 publications concerned, directly or indirectly, with the derivation and application of TME-type data.

RÉSUMÉ

La méthode de l'énergie métabolisable vraie (ÉMV) pour évaluer les aliments des animaux comporte des dosages biologiques de l'énergie, des acides aminés, des lipides et des minéraux biodisponibles. Dans ce bulletin, on explique d'abord les principes du système (Introduction) à l'aide d'un diagramme montrant la répartition de l'énergie dans le corps de la volaille. Une section intitulée "Méthodes de dosage biologique" décrit les techniques de base et comprend des sous-sections couvrant diverses questions comme: les précautions à prendre dans la conduite des dosages, une description détaillée de la technique d'alimentation de précision, les détails de la conception et de la construction de cages pour les coqs adultes et une analyse de la technique de collecte des excréments. La partie sur la "Composition des aliments" contient des données sur les teneurs en azote, extrait éthéré,

cellulose brute, fibre au détergent neutre, cendres, calcium, phosphore, énergie brute, ÉMV, ÉMV ramené au bilan azoté zéro ($ÉMV_n$), acides aminés totaux et acides aminés disponibles vrais (AADV), de tout un assortiment de matières alimentaires. Les données sont calculées sur la matière sèche. Complément important du bulletin, la "Bibliographie" contient plus de 500 titres de publications touchant de près ou de loin à l'obtention et à l'utilisation des données basées sur l'énergie métabolisable vraie.

PREFACE

In 1981 the Animal Research Centre published Technical Bulletin No. 3 entitled: Bioassays Based on Precision Feeding of Poultry. The French version was entitled: Dosage biologique en cage métabolique chez la volaille. The Bulletin contained a brief description of the precision feeding technique and of the assays based thereon. The primary purpose of the Bulletin was to be a bibliography of relevant literature and 162 references were listed.

An enlarged and updated version entitled: The T.M.E. System of Feed Evaluation was published in 1983 as Contribution 1983-20E of the Research Branch of Agriculture Canada. The French edition was Contribution 1983-20F and was entitled: La méthode d'évaluation des aliments par le calcul de l'énergie métabolisable vraie (E.M.V.). Features of the 1983 version were an enlarged section on assay methodology, inclusion of a section describing feedingstuff composition, and extension of the bibliography to 314 references. Demand for the revised Bulletin exceeded all expectations and approximately 1200 copies were distributed in less than two years.

The present Bulletin is an updated version of the 1983 edition. The introduction and methods sections have been revised in the light of recent research. The feedingstuff composition section is greatly expanded by data describing additional samples and by the inclusion of total and true available amino acid values. More than two hundred references are added to the bibliography.

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ACKNOWLEDGEMENTS

The author wishes to thank all those who helped with the preparation of this Bulletin. Several people provided references to TME-related publications while others provided samples of feedingstuffs for analysis; their cooperation is appreciated. The preliminary drawings for the figures illustrating cage design and construction were prepared by F. Nachbaur; final drawings and all photographs were prepared by Research Program Service, Agriculture Canada. The feed composition tables could not have been compiled without the technical help of S. Winter, R. Cochrane and L. Hope; the proximate and amino acid analyses were made, in part, by the Chemistry and Biology Research Institute, Agriculture Canada. The staff of the poultry unit of the Animal Research Centre, Research Farm provided valuable help by caring for birds and participating in bioassay work. Finally, my thanks to D. Leger for editorial assistance throughout the preparation of the Bulletin.

DISCLAIMER

Mention of a trade name, proprietary product, or specific equipment does not imply its approval to the exclusion of other products which may be suitable.

INTRODUCTION

The true metabolizable energy (TME) system of feed evaluation, which is gaining wide acceptance (Figure 1), comprises bioassays for TME, TME corrected to zero nitrogen balance (TME_n), true available amino acids (TAAA), true available lipids (TAL) and true available minerals (TAM). Each assay involves corrections for metabolic plus endogenous losses. The desirability of making such corrections was recognized by Armsby (1)* who wrote: "since the digestion experiment as ordinarily conducted ignores the presence in the faeces of excretary products, the results obtained by its use will necessarily be too low." Goodwin's translation of Kellner (3) states: "the assumption is made that dung consists only of undigested food. The assumption, however, is not quite correct, for the faeces are always mixed with small quantities of substances which come from the digestive organs and which are termed the products of metabolism." Despite this early recognition of the problems associated with metabolic and endogenous losses, little attention was given to the introduction of appropriate corrections. The assay for the 'biological value' of protein included corrections for metabolic fecal and endogenous urinary nitrogen losses (2) and nitrogen-free diets have been used in some amino acid availability studies. However, the need for corrections has generally been ignored and the teachings of Kellner and Armsby seem to have been forgotten.

By making corrections for metabolic and endogenous losses, the assays of the TME system should provide data which are independent of the species, strain, sex, age and physiolcgical state of the assay bird. Ideally, the data should be independent of species in general but this state is unattainable because of the wide variation in microbial activity within the alimentary tracts of diverse species such as the cow, pig and chicken. Such microbial activity has profound effects on the composition of ingesta offered for digestion and absorption by the host animal.

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* Numbers in brackets refer to publications listed in the bibliography which starts on page 73.

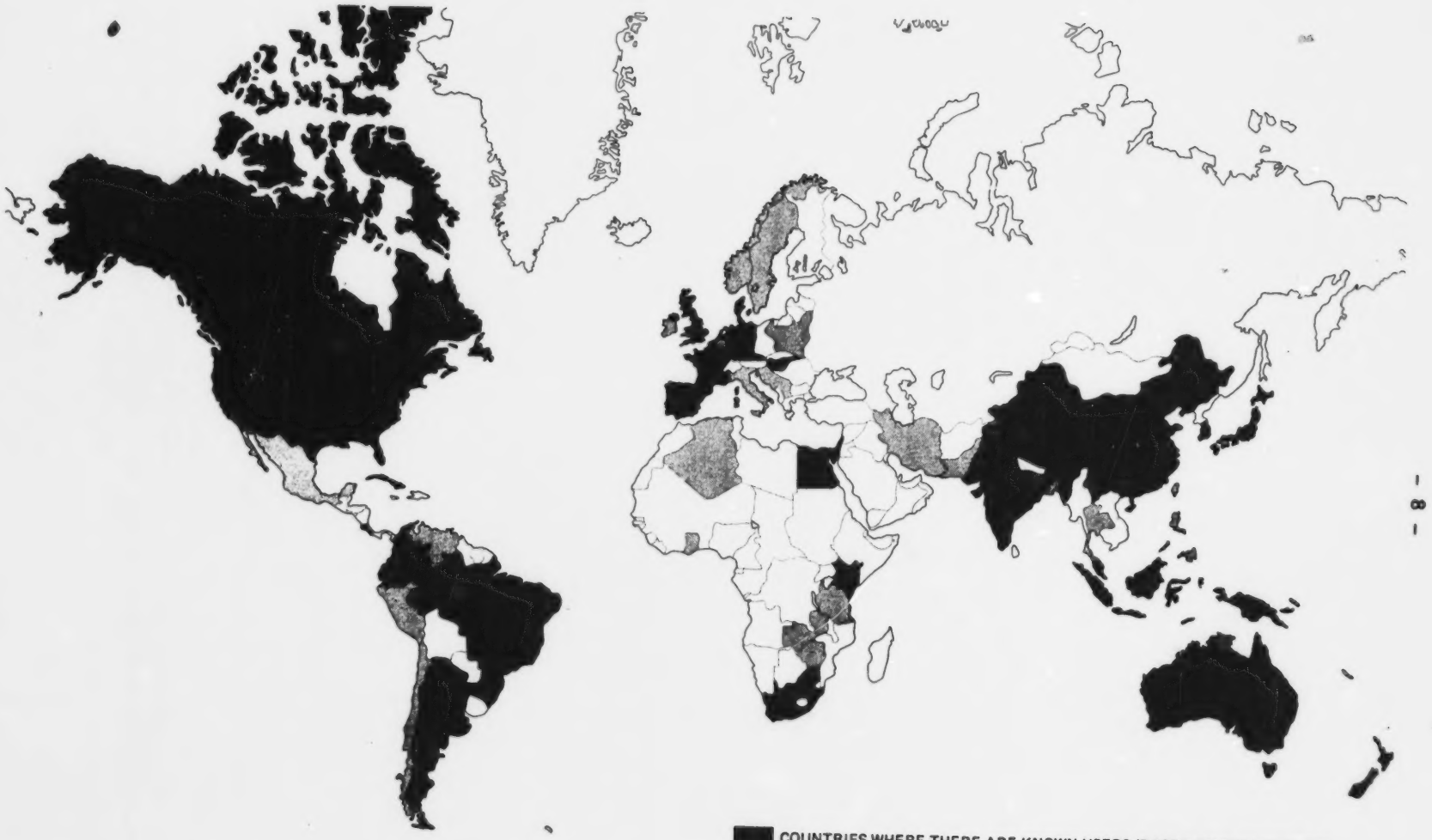

Figure 1. Adoption of the TME system.

The term TME was defined by Harris (4). The effect of metabolic fecal and endogenous urinary energy losses on apparent metabolizable energy (AME) values was described, with theoretical data, by Guillaume and Summers (5). The relationships between AME and TME are described in detail in two recent publications (526,556). Corrections for metabolic and endogenous losses are equally important and have similar effects in TAAA, TAL and TAM assays.

It is now common practice to correct TME values to zero nitrogen balance. The reasons are explained in detail by Wolynetz and Sibbald (526) who conclude that the correction causes estimates of bioavailable energy "to be based on the assumption that the available energy is being used for a single common purpose, the production of heat, and that the composition of the bird is unchanged." There are no comparable corrections in the TAAA, TAL or TAM bioassays. However, the TAM assay differs from other assays of the TME system because an intake of a mineral in excess of the requirement and storage capacity is likely to be excreted. Therefore in the TAM assay the mineral intake must be kept below the requirement. Intakes in excess of the requirement have no effect on the TAAA bioassay because the surpluses are voided as uric acid not amino acid. Similarly, in the TME_n and TAL bioassays excesses are stored as fat or lost as heat and do not affect the results.

The assays usually involve precision-feeding a fasted bird with a known quantity of the test feedingstuff and collecting the resulting excreta. Each feedingstuff is fed at two, or more, levels of input to establish the relationship between nutrient input and output. For simplicity and convenience one input level is usually zero. Voluntary feeding has been used successfully as a substitute for precision feeding but it is subject to errors associated with feed spillage and consequent inaccurate estimates of intake. Furthermore, since birds eat at different rates the estimates of metabolic and endogenous losses may be subject to greater error.

Fasted birds tend to catabolize more body protein than fed birds thus increasing metabolic energy excretion and introducing a bias into the TME assay. Similarly, the loss of body protein as energy-containing excretory

products is affected by the amount and composition of the test feedingstuff, a secondary cause of bias. The problem is controlled by correcting the excreta energy outputs of both fed and fasted birds to zero nitrogen balance. The method for making the correction is explained later.

A schematic representation of the partition of ingested feed energy by the bird is presented as Figure 2. The terminology and abbreviations are similar to those published by the National Research Council of the United States (256). The figure differs in certain respects from that published in the second edition of this Bulletin. The feces are assumed to comprise three energy containing fractions: the fecal energy of feed origin (F_iE); the endogenous fecal energy (F_eE); and the metabolic fecal energy (F_mE). The F_eE is contained in microflora and microbial debris and, for most practical purposes, may be considered part of the F_iE. The urine also comprises three energy containing fractions: the urinary energy of feed origin (U_iE); the metabolic urinary energy (U_mE); and the endogenous urinary energy (U_eE). The U_mE is contained in products of tissue catabolism, it being assumed that anything absorbed across the gut wall immediately becomes part of a tissue. The U_eE is contained in the excretory products resulting from protein turnover.

The partition shown in Figure 2 differs from that of the National Research Council (256) inasmuch as the F_mE and U_eE are included as part of the net energy for maintenance. Further, the U_mE is placed under the net energy for production because it results from tissue catabolism which may occur at the same time as tissue synthesis as well as in the absence thereof. The figure helps to explain the differences between AME and TME and shows that feces and urine contain energy components which are derived from the body rather than the feed.

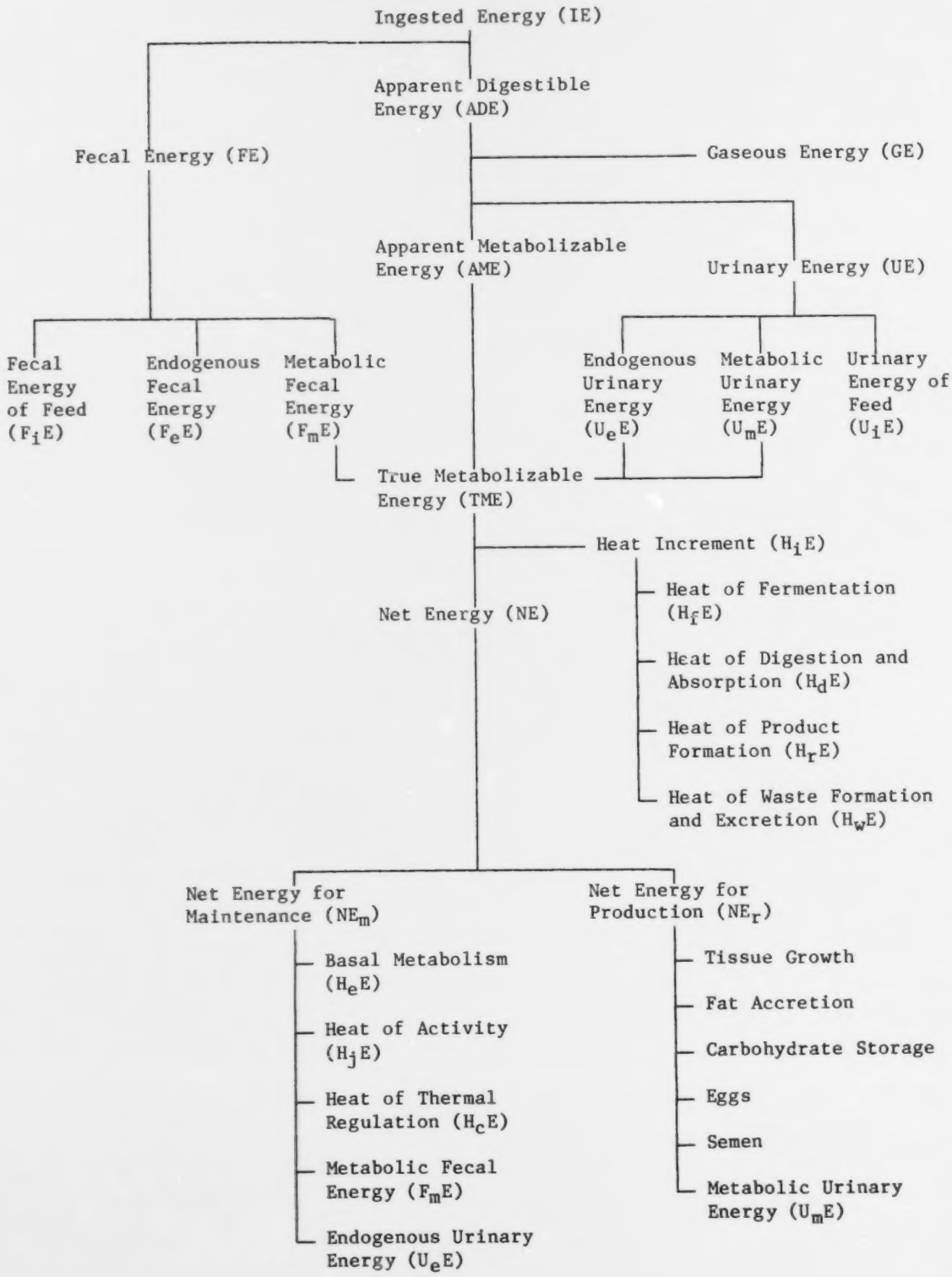

Figure 2. The partition of ingested feed energy in the bird (the forerunner of this scheme is described in reference 336).

BIOASSAY PROCEDURES

General

The assays of the TME system have several procedures in common and may be performed simultaneously providing that there are sufficient excreta available for the physical and chemical analyses. Birds are fasted, to empty their alimentary canals of feed residues, and then precision-fed a known quantity of the material to be assayed. Each bird is placed in a wire cage, where water is available ad libitum. The time is recorded and the excreta are collected quantitatively for a predetermined period of time. One bird in each replication remains fasted and serves as a negative control for the estimation of metabolic plus endogenous losses. The excreta, together with samples of the test materials, are assayed for gross energy, amino acids, lipid or mineral elements as appropriate. The basic calculation is as follows:

$$TX = IX - (FX + UX) + (F_mX + U_mX + U_eX)$$

where: TX is the true available nutrient X;

IX is the amount of X placed in the fed bird;

(FX + UX) is the amount of X excreted by the fed bird; and

$(F_mX + U_mX + U_eX)$ is the amount of X excreted by the fasted bird.

The preferred bird is a dubbed adult cockerel of an egg-laying strain, which has never had access to grit. Other birds may be used but chicks have limited feed capacity, while fasted laying hens often produce shell-less eggs which tend to break and contaminate the excreta. Laying birds may be useful in assays for TAM where a high mineral requirement is desirable (338), but this is an atypical situation. Grit is avoided because it may be retained in the gizzard and voided on an irregular basis. Grit in excreta damages grinding equipment and introduces major errors into short-term mineral balances.

All birds used in an assay must have been maintained on the same diet. The composition of the diet is not of critical importance providing that it allows the birds to satisfy their nutrient requirements. Many laboratories

feed a laying hen diet, containing 15% of protein, during the maintenance period between assays. The preliminary fast is usually for 24 hours but a longer period may be required if the maintenance diet contains substantial quantities of indigestible materials. Where uncertainty exists it is advisable to measure the gut-clearance time of the maintenance diet before embarking on a series of assays.

As the input of test material increases, the effects of experimental errors are reduced but the possibility of regurgitation increases; 30 to 40 g of air-dry feed is usually satisfactory. Large inputs, particularly of bulky feedingstuffs can lead to crop impaction. Impacted birds have extended feed residue retention times and consequently may yield misleading data. An exception to the foregoing is the TAM bioassay in which the input of the test mineral should be no greater than the bird's requirement because excess minerals are voided as minerals in the excreta.

The use of fasted birds to measure metabolic plus endogenous losses is simple and convenient. The data obtained from a single group of such birds can be used to correct the excreta outputs of several other groups, in the same assay, fed a variety of feedingstuffs. The optimal number of fasted birds in an assay depends on several factors as discussed by Wolynetz and Sibbald (526). However, the use of fasted birds is not essential. The objective is to measure the relationship between the nutrient excreted and the nutrient input and this can be achieved by using two or more levels of input, none of which need be zero.

Initially, it was recommended that the test material be pelleted but this is not necessary if the stem of the feeding funnel has an internal diameter of about 1.0 cm; however, care must be taken to avoid loss of feed by adherence to the funnel. Very dusty or hygroscopic materials are best fed in conjunction with a carrier, such as 90% ground maize plus 10% of vegetable oil; this makes it necessary to assay the carrier. The use of precision feeding is not essential although it is preferred. Assay data have been obtained successfully from birds allowed to consume feed voluntarily.

Test materials are weighed prior to an assay and held in containers until used. Clear polypropylene containers (130 ml) with close fitting lids such as are used for urine samples are satisfactory. Sub-samples of the test materials must be weighed for dry matter determination at the same time as the containers are being prepared. The timing is important because it avoids errors associated with water uptake or loss by the test materials. All analytical data describing the test materials should be expressed on the basis of dry matter.

In this laboratory, birds are housed and maintained in individual wire cages on the lower level of a two-tier system. Cage design and construction are described later (page 22). Water is provided by a nipple system and feed is available in a trough running the full length of each block of cages. At the start of an assay, fasting is initiated by removal of the feed trough. Under other management systems, such as when water is provided in troughs, it is important that feed in the water system or adhering to the cages be removed.

Fasted birds are taken from the lower tier of cages, given the appropriate treatment, and then housed in alternate cages of the upper tier. The technique of precision feeding is described later (page 17). The upper cages are used only during excreta collection periods and are scrupulously cleaned prior to each assay. Excreta collection trays are placed under each bird. The trays, preferably made of smooth plastic, are larger than the bottom of each cage thus reducing the chance of excreta loss. An alternative excreta collection technique is described later (page 28).

Handling of birds causes losses of scale and feathers making quantitative excreta collection difficult. Blowing scale off the excreta collection trays an hour after housing reduces the problem. Excreta are collected at about 24 and again at exactly 48 hours after housing. A single 48 hour collection may be satisfactory but the double collection is favoured, when trays are used, because it reduces excreta deterioration and contamination. When the assays were first described a collection period of 24 hours was suggested but subsequent work showed this to be insufficient for clearance of the residues

of some test materials. Excreta adhering to the cage must be collected and excreta must be washed from any feathers trapped on the excreta collection tray. The trays must be checked for regurgitated feed which, if present, invalidates the use of the bird in the assay. The two excreta samples from each bird are frozen, dried, equilibrated with atmospheric moisture, weighed, pooled, ground, mixed and assayed. Freeze-drying is preferred because it leaves the excreta in a sponge like, easy-to-grind form; however, oven drying has been shown to be satisfactory for TME (97) and TAAA (370) bioassays. In some laboratories the excreta from several birds are pooled to reduce the analytical work. The procedure should not alter the estimated TME, TAAA, TAL or TAM values but it does restrict the ability to assess variation and to make comparisons between samples (343).

Recent work has demonstrated the advisability of correcting TME values to zero nitrogen balance (TME_n). As a first step in the calculations the excreta energy output (FE + UE) is corrected to zero nitrogen balance ($FE_n + UE_n$), as follows:

$$(FE_n + UE_n) = (FE + UE) + k(IN - FN - UN)$$

where: k is a constant which estimates the gross energy content of the excretory products resulting from the catabolism of a unit weight of tissue nitrogen;

IN is the nitrogen input as test material; and

FN and UN are the fecal and urinary nitrogen outputs.

For fasted birds, IN is zero. In most assays the term k(IN - FN - UN) is negative; consequently, ($FE_n + UE_n$) is usually smaller than (FE + UE). The nitrogen-corrected energy excretion of a fasted bird is better described as ($F_{m\,n} E + U_{m\,n} E + U_{e\,n} E$). TME_n values are calculated as follows:

$$TME_n = IE - (FE_n + UE_n) + (F_{m\,n} E + U_{m\,n} E + U_{e\,n} E)$$

where: IE is the amount of energy, as test material, placed in the bird.

There is no evidence that similar corrections are required in any of the other bioassays of the TME system.

Precautions

The following is a list of precautions to be observed if high quality assay data are to be obtained. The list concludes with the most common causes of abnormally large and small values.

1. Assay birds must be in good health.
2. All assay birds must be fed the same maintenance diet between assays.
3. Assay birds should be grit-free.
4. Test materials must be assayed for dry matter at the time that they are weighed into containers in preparation for feeding to the birds.
5. Dusty and hygroscopic test materials should be fed in conjunction with a carrier; the carrier must also be assayed.
6. Assay birds must be fasted for sufficient time to allow all feed residues to be voided.
7. Feed removal for fasting must be total. Feed adhering to the cage and usually ignored by the bird will be eaten if no other is available.
8. Birds must have continuous access to fresh water.
9. Excreta trays must be checked for regurgitated feed which, when found, eliminates the bird from the assay.
10. The excreta collection period must be exactly the same for all birds in an assay.
11. When using adult cockerels, and feed inputs of 30 to 40 g, an excreta collection period of 48 hours should be sufficient. For other birds and inputs a preliminary experiment may be necessary to establish the length of the collection period.
12. Excreta collection must be quantitative. Feathers must not be included and scale is to be avoided as much as possible.
13. Dried excreta should be equilibrated with atmospheric moisture or be held in such a manner that its moisture content remains constant between weighing and sub-sampling for analysis.

Abnormally large values may result from:

a. incomplete clearance of the residues of the test material, check for crop impaction;
b. incomplete excreta collection, excreta may have been voided beyond the collection tray;

c. unobserved regurgitation beyond the collection tray causing excreta output to be too small;
d. errors in weighing, preparing or administering the test material; and
e. analytical errors.

Abnormally small values are obtained when:

a. the preliminary fast is inadequate and residues of the maintenance diet are assumed to be derived from the test material;
b. the bird has access to feed during the fast;
c. regurgitated feed is mixed with the excreta;
d. scale or feathers are included with the excreta; and
e. preparatory and analytical errors.

The assays are simple and relatively fast. However, like all assays they require care and attention to detail if high quality data are to be obtained.

Precision Feeding

The purpose of precision feeding is to ensure that a known quantity of a feedingstuff enters the alimentary canal of a bird at a known time. The procedure avoids the need to recover waste feed, prevents feed selection and eliminates variation of intake among birds. All of these problems are encountered when birds ingest feed voluntarily.

Precision feeding involves insertion of a tube from the beak, via the esophagus, into the crop, causing feed to move through the tube, and removal of the tube. The initial method developed at the Animal Research Centre used a simple glass tube into which pelleted feed was placed and then pushed into the crop with a glass rod. From this was developed a glass funnel and metal plunger. With experience came the ability to insert tubes with larger diameters and an effective device was prepared by taping a glass powder funnel to a piece of 1.2 cm diameter copper water pipe. A metal rod was used as a plunger. Today, a stainless steel funnel is used with a stem 40 cm long, an external diameter of 1.2 cm and an internal diameter of 1.1 cm. The plunger consists of a 1.0 cm diameter aluminum rod to which a 3.0 cm diameter spherical knob is attached. A plastic sleeve is riveted to the rod to

prevent the plunger from projecting more than 0.5 cm beyond the end of the funnel. Ease of operation demands that the funnel be light in weight and well balanced. Heavy funnels, particularly those with uneven weight distribution, are difficult to control when in the bird. Plastic funnels have the advantage of light weight but many possess electrostatic properties which make quantitative feed delivery impossible. Some of the feeding devices which have been used in this laboratory are shown in Figures 3 and 4.

Successful precision feeding depends upon control of the bird. A simple, rapid technique used at the Animal Research Centre is as follows. The operator sits on a stool, or chair without sides, and crosses his left leg over his right. A bird is taken with both hands and placed with the keel (breast bone) pushed into the groove formed by the left thigh and abdomen of the operator. The body of the bird is at 45 degrees from the vertical. The legs of the bird project to the left and are unable to gain leverage on anything. The bird is held firmly in place with the elbow of the left arm, and the beak is grasped from above the head with the left thumb and fore-finger. The neck of the bird is slightly extended, the beak is opened and the stem of the funnel is inserted. The funnel should move down the esophagus and into the crop with a minimum of effort. If a blockage is encountered, wait a few seconds for the bird to swallow or relax. If this is unsuccessful, remove the funnel and try again. Feed is poured into the funnel from a container held in the right hand and pushed into the crop by a second operator. If the funnel tends to move out of the bird as feed is pushed down, the end of the funnel is in the esophagus not the crop. Deposition of feed in the esophagus can lead to regurgitation. The funnel is withdrawn using the right hand. The left hand is moved to the neck of the bird and gentle pressure is applied to the esophagus. This, coupled with rotary withdrawal of the funnel, removes feed particles which may have adhered to the outside of the stem of the funnel. The complete operation usually takes less than one minute per bird.

The precision feeding technique is illustrated in Figures 5 to 12. A six-minute, 16 mm, colour, sound film entitled "Poultry Force Feeding - An Experimental Technique" is available by writing to: Communications Branch, Agriculture Canada, Ottawa, Ontario, Canada, K1A 0C7.

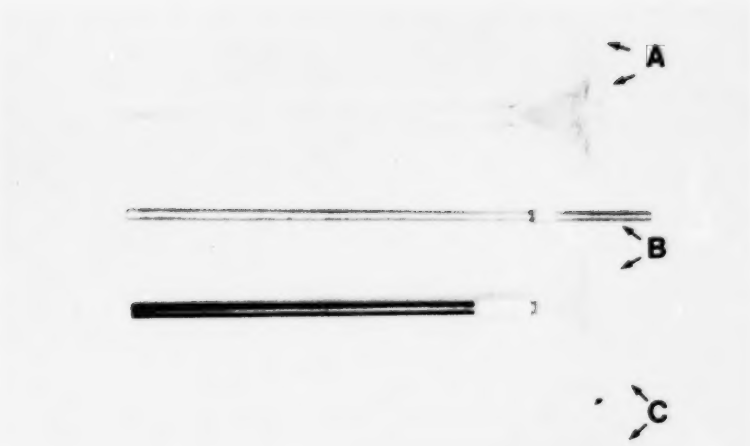

Figure 3.

Some early feeding devices: (A) glass funnel and rod, (B) copper water pipe attached to a glass powder funnel and an aluminum plunger, (C) simple glass tube and rod.

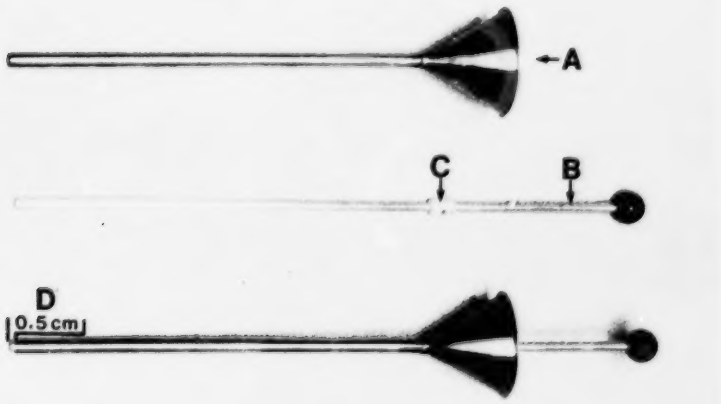

Figure 4.

Stainless steel funnel (A) with aluminum plunger (B). Note plastic sleeve (C) on plunger which controls penetration (D) beyond the end of the funnel.

Figure 5. Bird is placed at a 45° angle with keel in groove formed by the operator's thigh and abdomen.

Figure 6. The legs project and cannot gain leverage on anything. The bird is held in place by the left elbow.

Figure 7. The beak is opened from above using the thumb and forefinger of the left hand.

Figure 8. The neck is slightly extended and the stem of the funnel inserted.

Figure 9. The inserted funnel is held in place by the thumb and forefinger.

Figure 10. Feed is poured into the funnel.

Figure 11. Feed is pushed down the funnel by a second operator. Note that the first operator helps to hold the funnel in place.

Figure 12. The funnel is removed with a rotary action, pressure is applied to the esophagus with the left hand to dislodge feed particles adhering to the stem of the funnel.

Cage Design and Construction

The cages used to house the adult cockerels have the following dimensions: depth (front to back) 40.6 cm, height 50.8 cm and width 30.5 cm. Figures 13 to 21 describe the cages, their assembly and use; all dimensions are in centimetres. The back, top and floor of a row of 10 cages is fabricated from a single piece of wire mesh approximately 1.3 m wide x 3.05 m long. The wire is 2.03 mm diameter (14 gauge). The mesh is a 5.1 x 2.5 cm grid welded at each corner. The internal partitions and ends are made of the same material. The cage fronts, also 3.05 m in length, are made from 4.11 mm diameter (8 gauge) wire. The door opening of 23 x 28 cm provides adequate access to remove the birds. The cages are set up in a double-deck arrangement and the droppings board is placed horizontally to hold the excreta collection trays. Water is available from a nipple system on the top of the cages.

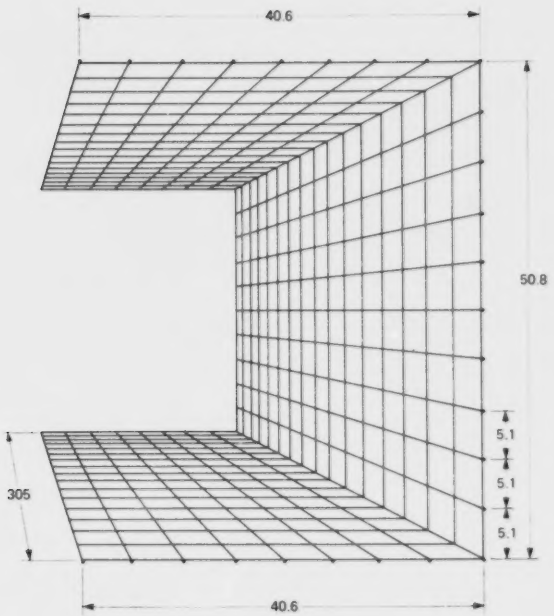

Figure 13. End view of the single piece of wire mesh which is folded to create the body (top, back and bottom) of a row of 10 cages.

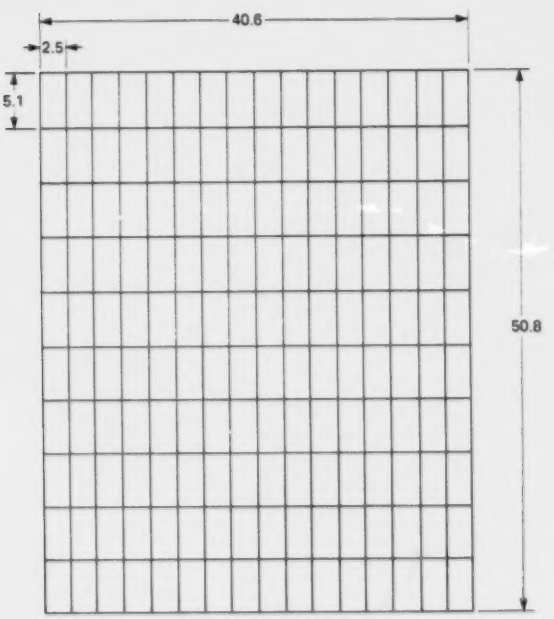

Figure 14. A typical cage partition or end. Partitions are located at 30.5 cm intervals and are welded in place.

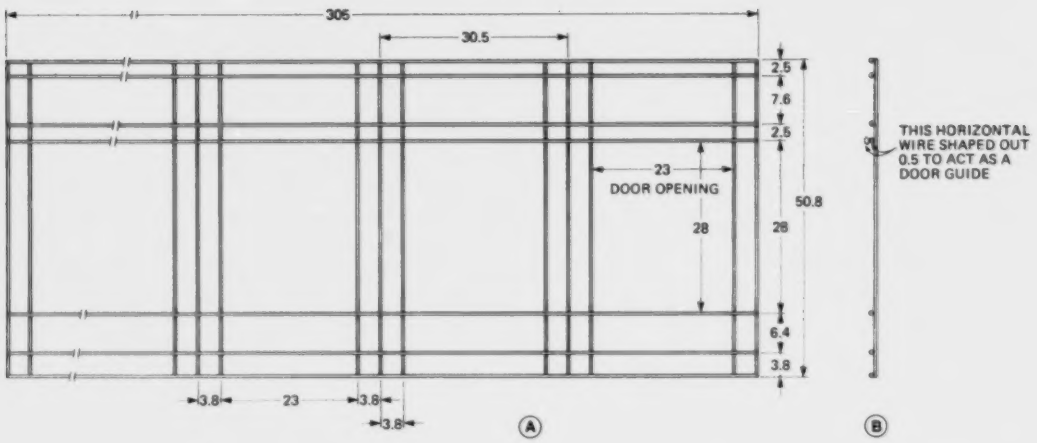

Figure 15. A. The front for a row of cages.
B. Side view of cage front.

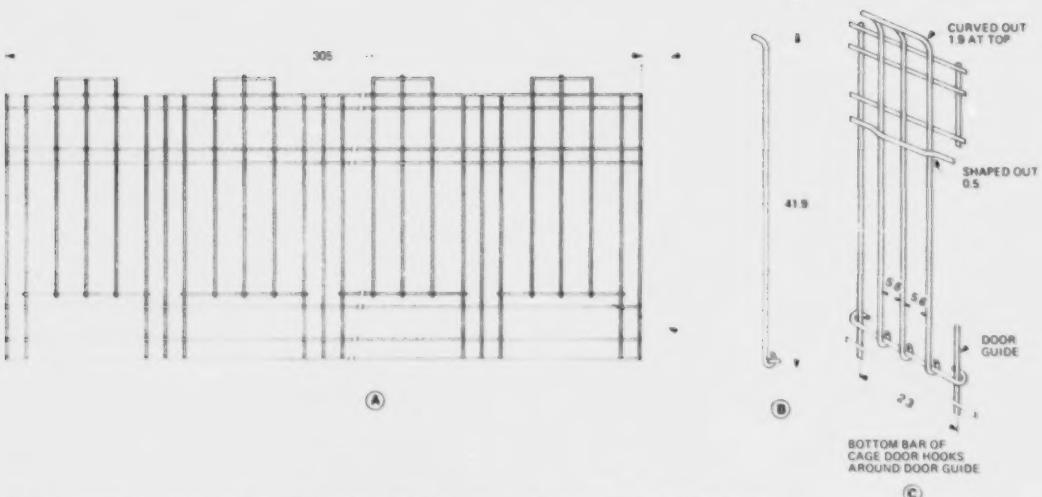

Figure 16. A. The front with cage doors installed.
B. Side view of cage door.
C. Detail of cage door.

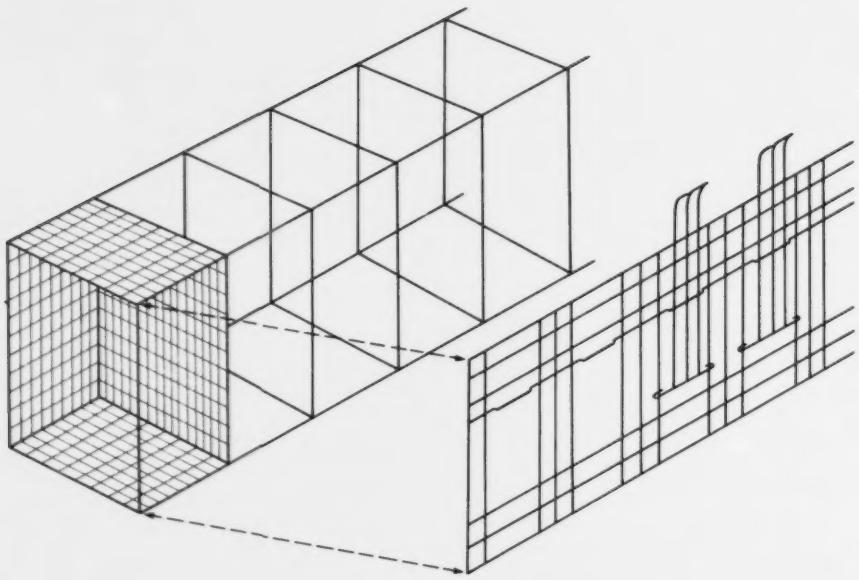

Figure 17. The relationship between the cage body with partitions and the front. For simplicity, only 2 doors are shown on the front.

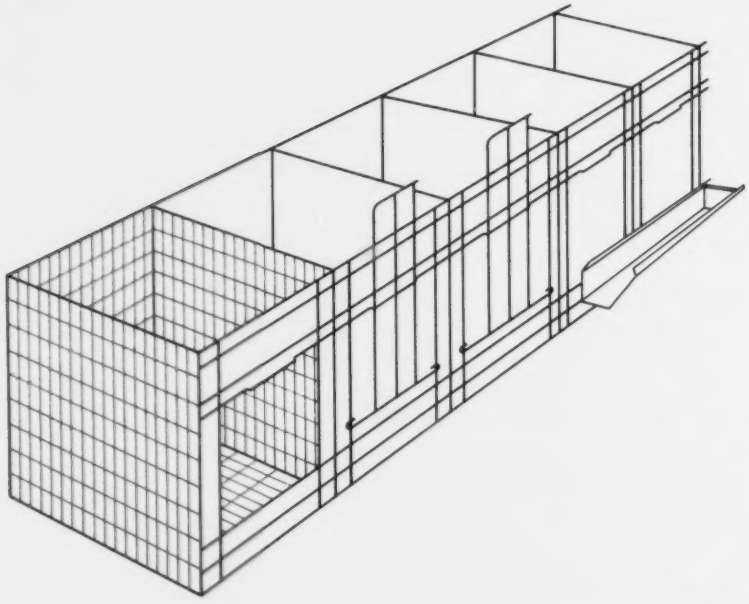

Figure 18. An assembled cage unit with feed trough.

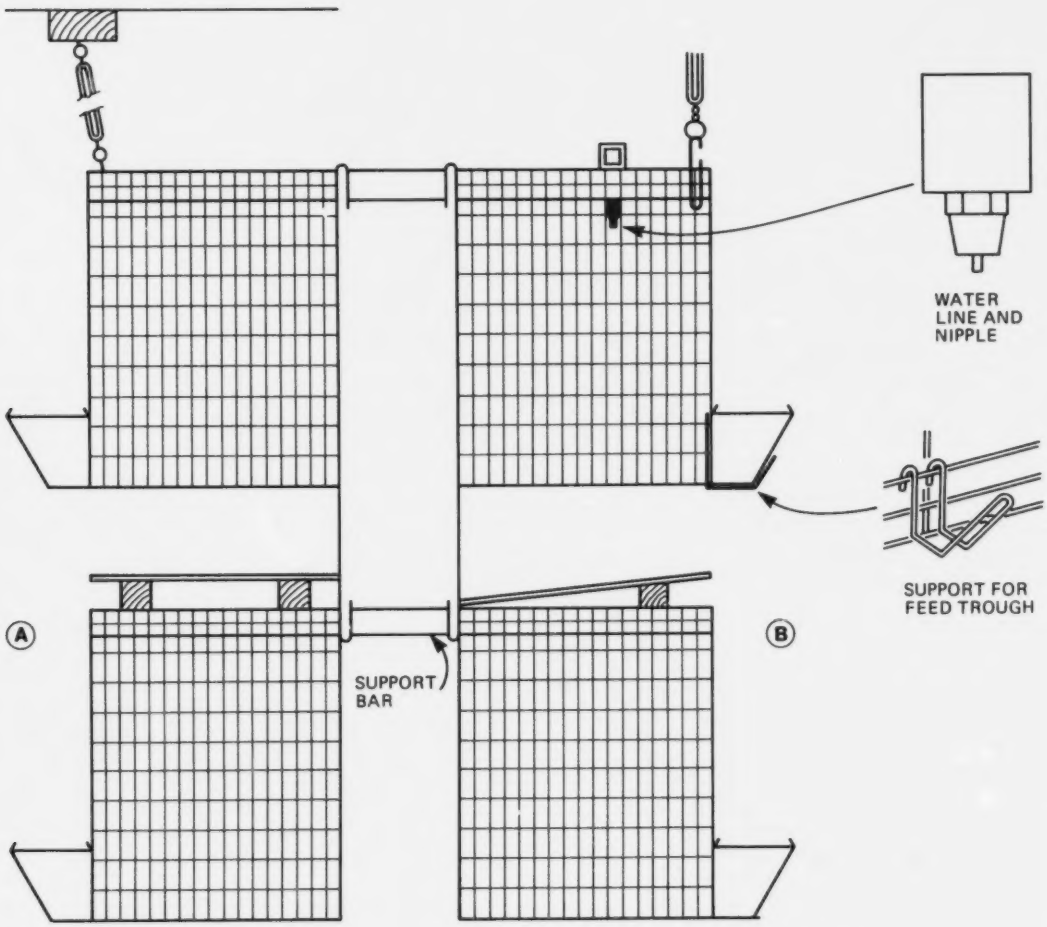

Figure 19 Side view of a 4-row double deck battery of cages showing, (A) position of droppings board to hold excreta collection trays and (B) normal position of droppings board.

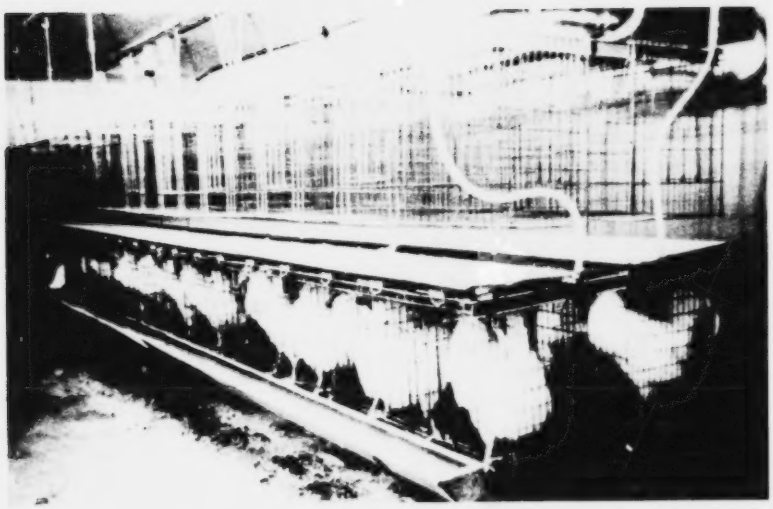

Figure 20. Cages being used to maintain birds between assays.

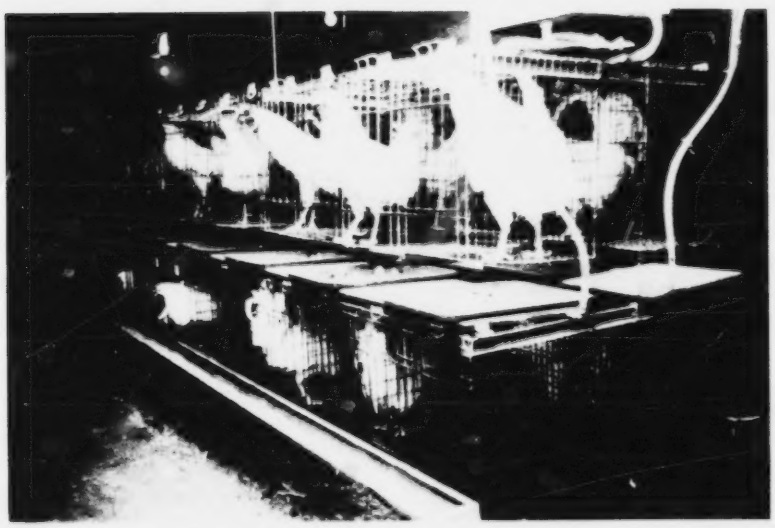

Figure 21. Birds housed in cages of upper tier being used in an assay.

Excreta Collection

Initially, excreta were collected on smooth plastic trays which were larger than the bottoms of the cages. The procedure continues to be used in many laboratories but has the disadvantage that scale and feathers may be trapped in the excreta. There is also the possibility of excreta falling beyond the edges of the trays.

A procedure whereby human colostomy bags are attached to birds to collect excreta was described in the previous edition of this Bulletin. After working with the procedure in a number of assays it was abandoned because: a) there was a high incidence of adhesive failure and samples were lost due to bags falling off the birds; and b) removal of those bags which remained attached caused feathers to be pulled out so that the area around the cloaca was denuded.

A harness designed to hold an excreta collection bag has been developed in Portugal (444). Modifications have been made to the design and the harness is now used routinely at the Animal Research Centre. The major modification is the addition of two short tapes which are tied around the base of the tail to prevent vertical slippage. When using the harness four holes are cut in the collection bag and the tapes are threaded through them. The neck of the bag is then folded back. With this procedure the use of adhesive tape to hold the bag to the harness is avoided. When the harness is on the bird, the ends of the two long tapes are tied together as a precaution against lateral slippage. The harness, its method of attachment, and its use are illustrated in Figures 22 to 35.

At the Animal Research Centre, the collection bags are labelled, holes for the tapes are cut, the weight of each bag is recorded, and the bags are attached to the harnesses. The harnesses, with bags, are attached to the birds immediately after precision feeding. At the conclusion of an excreta collection, the harnesses are removed from the birds and the bags plus excreta are separated from the harnesses. The excreta are frozen, freeze-dried, and equilibrated with atmospheric moisture while in the bags. The procedure is efficient and provides excreta free of scale and feathers.

Care is required when attaching a harness to a bird. If the tension of the tapes is too great the bird has difficulty maintaining its balance and bruising appears in the wings. Even when the minimum required tension is used there is a temporary disturbance of balance for one or two minutes.

Birds do peck at the bags and can cause additional damage with their spurs. Debeaking and spur removal reduces the problem and has the additional benefit of making the birds easier to handle. Detection of leaking bags, and of regurgitation, is made easier if excreta collection trays are placed below harnessed birds. Clipping the feathers around the cloaca is recommended to prevent excreta adherance.

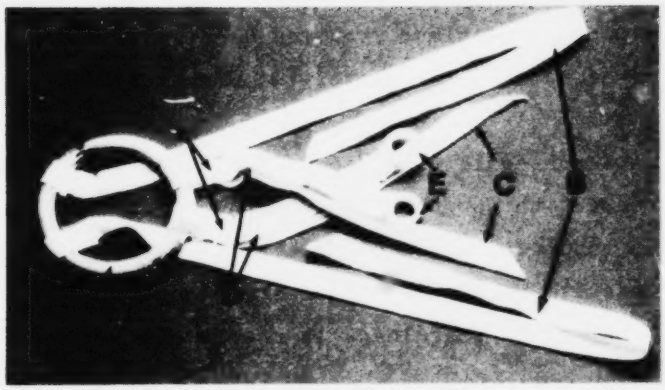

Figure 22. The excreta collection harness comprises a plastic ring (OD 7.5 cm, ID 5.75 cm) (A), 2 long cotton tapes (40 cm) (B), 2 short cotton tapes (20 cm) (C) and 2 elastic tapes (10 cm) (D) each attached to two small plastic rings (OD 1.9 cm) (E) which serve as buckles. Each D is sewn to the corresponding C at F. All the tapes are 1.25 cm wide and the ends of the cotton tapes are varnished to prevent fraying.

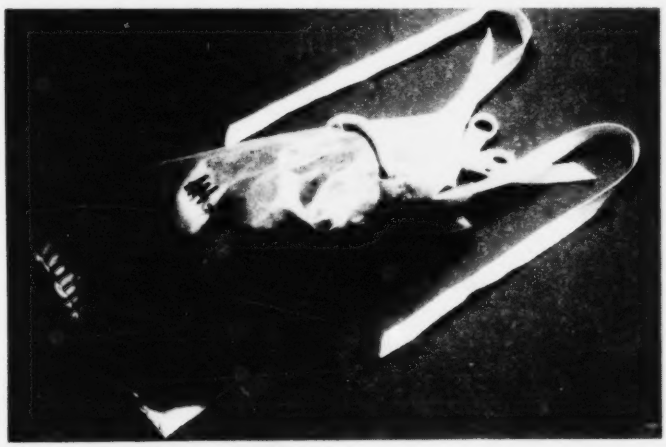

Figure 23. The tapes of the harness are threaded through holes in a labelled and weighed plastic bag which measures 15.2 x 25.4 cm. x .10 mm thick (see also Figure 34).

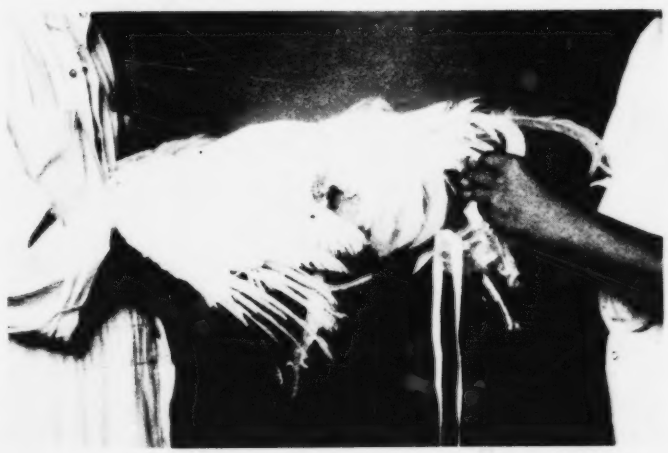

Figure 24. Harness and bag about to be attached to the bird. The first step is to attach the short tapes around the base of the tail. Note that the neck of the bag has been everted over the large ring.

Figure 25. Tying the short tapes.

Figure 26. A long tape is placed between the thigh and the abdomen and is then brought around the shoulder.

Figure 27. Each long tape is buckled to the elastic tape on the opposite side of the back using the pair of small rings. When in place these tapes form a cross on top of the back.

Figure 28. The ends of the long tapes are tied together to reduce the chance of lateral slippage.

Figure 29. The location of the plastic ring when the harness is in place. The collection bag has been removed. Note that the feathers around the cloaca have been clipped.

Figure 30. The location of the collection bag when the harness is attached.

Figure 31. Bird immediately after attaching bag and harness.

Figure 32. Bird with plastic bag containing excreta.

Figure 33. Rear view of bird showing collected excreta.

Figure 34. Bag and harness removed from bird.

Figure 35. Bag with excreta ready for further processing.

FEEDINGSTUFF COMPOSITION

Changes in feedingstuffs over time and the introduction of new analytical procedures combine to create a continuing demand for data describing feedingstuff composition. The second edition of this Bulletin contained a simple table listing the proximate composition, gross energy, TME and TME_n values of a variety of feed ingredients. The information has now been expanded in two directions. The original table has been revised and now includes data describing more than 200 additional samples; for many of the new samples calcium, total phosphorus and neutral detergent fibre values are presented. Three new tables present total and true available amino acid values for many of the new samples. Data are expressed as g/kg or MJ/kg of dry matter except in Table 4 where percentages are used.

Samples of feedingstuffs were obtained from several sources including commercial feed manufacturers, the Canadian Wheat Board, plant breeders and the Animal Research Centre Research Farm. On receipt, each sample was given a code number and all available information, descriptive of the sample, was entered in a catalogue. The samples were stored in sealed containers in a freezer until required for analysis.

At the start of a bioassay the required number of samples was withdrawn from storage, in the order of their receipt, and allowed to warm to room temperature. Coarse samples, such as whole grains, were ground. Each sample was thoroughly mixed and sub-samples were taken for the bioassay and for dry-matter measurement. If a sample was finely divided, additional sub-samples were taken for physical and chemical analysis. Alternatively, less fine material was reground prior to sub-sampling for the physical and chemical analyses; when this step was introduced new dry-matter measurements were made to minimize errors associated with variation in water content.

The feedingstuffs were assayed for dry matter, ether extract, nitrogen, crude fibre, ash and calcium using the procedures of the A.O.A.C. (Official Methods of Analysis, 1980). Phosphorus was measured by Hambleton's method

(Advances in Automated Analysis, 7th Technicon Int. Conf., 1976) and neutral detergent fibre by the procedure of Van Soest (J.A.O.A.C. 50:50-55, 1967). Gross energy was measured with a Parr adiabatic oxygen bomb calorimeter fitted with a 'master control' unit. Amino acids were measured with a Beckman 121M automatic analyzer following hydrolysis with 6N HCl (J. Agr. Food Chem. 13:266-288, 1965). A performic acid digestion (J. Biol. Chem. 238:235-237, 1963) was used in the analysis for sulphur amino acids.

The TME and TME_n values were measured as described herein. The preliminary fast was 24 hours, the feed input was usually 30 g of air-dry material per bird, and the excreta collection period was 48 hours. Each TME and TME_n value is the mean of 6 to 8 replicated observations. The TAAA assays were made using the excreta samples collected during the TME assays; however, excreta from birds given a particular feedingstuff were pooled, in proportion to the amounts voided by individual birds, to yield two composite samples each containing excreta from three or four birds. Amino acid profiles were obtained for each pooled sample and used to compute two sets of TAAA data from which the means of Tables 3 and 4 were calculated. Amino acid analyses of feedingstuffs were made in duplicate.

In Table 4 there are 18 values in excess of 100%. Most describe the bioavailabilities of arginine and lysine in ground yellow corn. Such values are erroneous and probably arose because the estimates of metabolic and endogenous amino acid losses, measured with fasted birds, differed slightly from those of the fed birds. Examination of the relevant duplicate values obtained with fasted birds showed them to be more variable and to have larger means than average. In other experiments (57, 95) the bioavailabilities of corn amino acids have approached 100% so it is reasonable that even small errors could result in substantial over-estimates. Additional factors possibly contributing to error are the low amino acid concentrations in corn and the relatively high lysine concentrations in the excreta of fasted birds.

Each feedingstuff is described in Table 1. Only abbreviated descriptions appear in Tables 2, 3 and 4 but reference to Table 1 descriptions is possible

by use of the code numbers which appear in the left hand column of each table. The code numbers also serve to allow readers to identify information added since the second edition (621-862). Those who have included the earlier table in their data banks will wish to avoid double entry of information and the consequent bias.

The nitrogen data are recorded as g/kg of dry matter. No attempt was made to estimate protein concentrations because the validity of some conversion factors is debatable. Recently, the assay for crude fibre was replaced by that for neutral detergent fibre; the latter assay does not apply to animal products and their fibre values are no longer estimated. Compositional means for feedingstuffs are not presented because they may be misleading if an anomalous sample in included.

The term 'whole ground' used to describe some grains means that whole, intact kernels were ground and assayed; there was no intentional classification or separation of the ground product. The term 'hull-less' denotes a genotype which produces a grain with little or no hull and should not be confused with 'dehulled' which implies physical removal of the hull. Oat groats, for example, are dehulled oats.

There are many sources of additional data which could be of interest to those constructing data banks. Many references will be found in the bibliography. The data recorded in Tables 1, 2, 3 and 4 were obtained within the facilities of Agriculture Canada subsequent to publication of a table appearing in reference 32.

TABLE 1

Nitrogen, fat, fibre, mineral (g/kg) and energy (MJ/kg) concentrations in the dry matter of several feedingstuffs[1,2]

Code	Description of Feedingstuff[3]	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
476	Alfalfa. dehydrated, meal.	28.4	23.0	250	-	91	-	-	18.9	6.5	6.1
359	Alfalfa. dehydrated, pellets.	30.2	26.1	290	-	92	-	-	18.8	6.6	-
372	Alfalfa. dehydrated, pellets.	25.4	34.0	291	-	91	-	-	18.6	4.9	-
440	Alfalfa. dehydrated, pellets.	23.3	30.7	276	-	93	-	-	18.9	4.4	4.4
MS	Alfalfa. dehydrated, pellets.	27.6	23.0	250	-	90	-	-	18.9	5.7	-
655	Alfalfa. dehydrated, pellets, second cut, Minnesota.	26.2	19.4	-	443	93	15.5	2.2	18.6	4.8	4.8
656	Alfalfa. dehydrated, pellets, first cut, Minnesota.	30.8	15.4	-	383	103	19.5	2.6	18.0	6.3	5.5
341	Alfalfa. dehydrated, pellets, 15% protein.	25.7	20.6	315	-	76	-	-	18.8	6.6	-
653	Alfalfa. dehydrated, pellets, (16%), 2nd cut, Minn.	26.2	19.0	-	429	92	16.1	2.2	18.6	4.8	4.5
839	Alfalfa. dehydrated, pellets, 17% protein, Nebraska.	28.2	18.5	-	385	92	8.8	2.4	18.8	4.2	4.0
378	Alfalfa. dehydrated, pellets, 18% protein.	30.1	51.8	261	-	78	-	-	18.7	5.6	-
657	Alfalfa. dehydrated, pellets, 18% protein, Nebraska.	30.1	18.5	-	382	94	12.0	2.6	18.7	4.2	4.0
652	Alfalfa. dehydrated, pellets, 19% protein, Nebraska.	29.8	23.3	-	394	95	14.0	2.8	18.7	4.8	4.6
338	Alfalfa. dehydrated, pellets, 20% protein.	36.2	35.0	213	-	95	-	-	19.1	7.0	-
654	Alfalfa. dehydrated, pellets, 20% protein.	29.8	17.5	-	409	104	10.4	2.4	18.6	3.8	3.7
348	Alfalfa. dehydrated, reground pellets, 15% protein.	26.8	20.7	265	-	111	-	-	18.1	4.8	-
349	Alfalfa. dehydrated, reground pellets, 17% protein.	29.4	24.7	238	-	116	-	-	18.2	5.6	-
350	Alfalfa. dehydrated, reground pellets, 20% protein.	37.2	32.9	224	-	123	-	-	18.2	6.1	-
351	Alfalfa. dehydrated, reground pellets, 22% protein.	37.2	30.5	199	-	128	-	-	18.5	6.6	-
339	Alfalfa. dehydrated, pellets, (17%) + vegetable fat.	28.2	21.8	301	-	90	-	-	18.8	4.9	-
340	Alfalfa. dehydrated, pellets, (22%) + ethoxyquin.	38.0	32.7	203	-	92	-	-	18.9	7.4	-
649	Algae. dehydrated.	60.6	19.2	-	6	69	4.9	13.9	22.2	9.2	8.5
650	Algae. dehydrated.	59.0	27.0	-	24	142	43.0	7.4	21.0	10.8	9.8
607	Alpha-protein. Nutritional Biochemicals.	143.9	-	-	-	20	-	-	23.0	15.4	14.3
609	Assay protein. Ralston Purina.	121.7	-	-	-	49	-	-	23.1	18.5	17.8
577	Babassu meal.	30.1	7.1	346	-	75	-	-	18.4	4.6	4.0
578	Babassu meal.	29.6	13.9	425	-	66	-	-	18.6	4.8	4.2
534	Barley. whole ground.	20.1	10.0	45	-	23	-	-	18.3	14.5	13.9
435	Barley. whole ground.	20.8	15.8	39	-	22	-	-	18.6	14.8	14.3
689	Barley. whole ground.	23.4	24.3	-	154	23	.5	3.0	18.7	13.5	13.0
690	Barley. whole ground.	21.2	15.0	-	183	25	.6	6.2	18.4	14.1	13.6

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
691	Barley. whole ground.	15.8	14.8	-	181	25	.5	3.9	18.3	13.7	13.4
692	Barley. whole ground.	21.1	16.4	-	139	25	.5	3.8	18.4	13.9	13.5
693	Barley. whole ground.	18.4	16.0	-	178	26	.4	3.7	18.3	13.8	13.3
694	Barley. whole ground.	19.5	14.1	-	175	29	.4	6.7	18.2	14.3	13.5
695	Barley. whole ground.	22.2	15.3	-	214	35	.6	3.9	18.5	13.0	12.7
696	Barley. whole ground.	20.2	20.3	-	164	27	.5	6.4	18.3	13.9	13.4
697	Barley. whole ground.	20.7	14.4	-	134	26	.5	6.2	18.3	13.9	13.4
698	Barley. whole ground.	23.4	15.7	-	140	27	.5	6.0	18.3	13.8	13.3
392	Barley. whole ground, Ontario.	22.1	18.0	47	-	24	-	-	18.7	14.5	-
473	Barley. whole ground, Quebec.	18.1	14.5	66	-	31	-	-	18.5	14.1	13.3
531	Barley. whole ground, (cv. Bruce).	20.0	16.5	57	-	29	-	-	18.2	13.5	13.2
367	Barley. whole ground, (cv. Conquest).	20.1	16.9	58	-	32	-	-	18.2	14.7	-
532	Barley. whole ground, (cv. Leger).	20.4	14.7	58	-	27	-	-	18.4	13.4	13.1
592	Barley. whole ground, (cv. Massey).	20.6	15.6	61	-	30	-	-	18.4	12.8	12.4
530	Barley. whole ground, (cv. Vanier).	18.1	15.2	64	-	29	-	-	18.3	14.0	13.5
769	Barley. whl. grd., No. 2 CW, 2-row, immat., 60kg/hL.	22.5	17.2	-	236	28	.7	7.0	18.5	14.1	13.6
765	Barley. whl. grd., No. 2 CW, 2-row, immat., 64kg/hL.	20.9	16.3	-	238	27	.6	5.3	18.4	14.3	13.6
762	Barley. whl. grd., No. 1 feed, green.	22.8	16.6	-	254	30	.5	5.3	18.5	14.2	13.6
775	Barley. whl. grd., No. 1 feed, green, 60 kg/hL.	17.9	15.0	-	213	32	.6	5.5	18.2	13.6	13.0
777	Barley. whl. grd., No. 1 feed, inf. var., 60 kg/hL.	26.4	15.7	-	261	25	.7	3.1	18.6	13.5	13.3
767	Barley. whl. grd., No. 1 feed, standard.	16.5	15.2	-	195	25	.6	3.3	18.2	14.1	13.4
768	Barley. whl. grd., No. 1 feed, standard, 72kg/hL.	18.9	16.0	-	186	27	.5	3.1	18.3	14.6	14.2
761	Barley. whl. grd., No. 1 feed, 46% plump, 6% thin.	20.8	16.5	-	272	27	.6	5.2	18.4	14.2	13.7
763	Barley. whl. grd., No. 1 feed, 60% plump, 8% thin.	19.0	11.1	-	239	27	.5	5.3	18.3	14.2	13.5
766	Barley. whl. grd., No. 1 feed, 38% plump, 6% thin, (68 kg/hL.)	26.9	17.5	-	256	20	.6	2.8	18.7	14.8	14.1
403	Barley. hull-less, ground.	26.8	14.0	34	-	29	-	-	18.8	13.5	12.8
404	Barley. hull-less, ground.	29.6	15.4	22	-	27	-	-	18.7	15.4	14.8
405	Barley. hull-less, ground.	28.2	13.2	31	-	27	-	-	18.8	14.1	13.6
406	Barley. hull-less, ground.	27.8	16.9	37	-	28	-	-	18.7	13.3	12.8
408	Barley. hull-less, ground.	28.3	14.8	30	-	29	-	-	18.8	13.9	13.4
409	Barley. hull-less, ground.	24.3	12.2	50	-	28	-	-	18.5	14.6	14.0
410	Barley. hull-less, ground.	27.8	12.7	29	-	27	-	-	18.6	14.0	13.4
411	Barley. hull-less, ground.	-	-	-	-	-	-	-	18.8	14.6	-
449	Barley. hull-less, ground.	27.8	13.5	22	-	17	-	-	19.0	14.9	14.5
450	Barley. hull-less, ground.	24.6	12.5	22	-	16	-	-	18.9	15.1	14.6
451	Barley. hull-less, ground.	26.7	13.2	21	-	17	-	-	18.3	15.1	14.5
452	Barley. hull-less, ground.	24.3	12.2	21	-	15	-	-	18.9	15.6	15.0

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
453	Barley. hull-less, ground.	27.4	15.6	23	-	18	-	-	18.9	15.3	14.8
454	Barley. hull-less, ground.	25.5	10.2	22	-	18	-	-	18.8	15.3	14.6
455	Barley. hull-less, ground.	27.3	13.1	22	-	17	-	-	18.9	15.4	14.9
456	Barley. hull-less, ground.	27.5	11.4	23	-	17	-	-	19.0	15.1	14.7
457	Barley. hull-less, ground.	26.8	14.4	21	-	17	-	-	18.9	15.2	14.8
458	Barley. hull-less, ground.	26.4	13.1	21	-	16	-	-	18.8	14.8	14.4
495	Barley. hull-less, ground.	26.0	17.4	33	-	20	-	-	18.7	13.3	13.1
496	Barley. hull-less, ground.	22.8	14.6	26	-	17	-	-	18.6	13.6	13.2
497	Barley. hull-less, ground.	20.4	12.1	24	-	18	-	-	18.4	14.2	13.8
498	Barley. hull-less, ground, (cv. Bichita).	24.5	14.9	21	-	18	-	-	18.5	14.1	13.6
407	Barley. hull-less, ground, (cv. Kun Lun).	26.3	15.5	27	-	24	-	-	18.6	14.0	13.3
549	Beans. black, ground, (cv. Loop).	39.2	12.3	46	-	49	-	-	18.4	6.9	7.0
546	Beans. faba, ground, (cv. Aladin).	46.5	10.9	92	-	30	-	-	18.6	11.6	11.3
545	Beans. faba, ground, (cv. Herz Freya).	43.8	12.4	91	-	34	-	-	18.4	12.0	11.2
547	Beans. mung, ground.	43.2	8.2	55	-	44	-	-	18.5	12.6	12.0
548	Beans. mung, ground, (cv. Morden 39).	39.9	8.7	58	-	85	-	-	17.7	11.9	11.4
544	Beans. white, ground, (cv. Seafarer).	37.7	16.8	47	-	47	-	-	18.5	8.6	8.3
483	Blood meal.	143.7	20.5	23	-	28	-	-	24.6	16.5	15.4
484	Blood meal.	151.6	9.0	14	-	22	-	-	24.6	16.4	15.1
617	Blood meal.	153.3	3.5	4	-	15	-	-	24.8	17.1	15.7
618	Blood meal.	154.0	3.7	3	-	14	-	-	24.8	17.3	16.0
666	Blood meal.	152.2	4.0	-	32	18	1.1	1.6	24.8	16.3	15.4
667	Blood meal.	158.8	5.1	-	12	17	.9	1.3	24.6	17.0	15.6
717	Blood meal.	157.0	1.1	-	-	15	.7	1.0	24.6	15.5	14.1
718	Blood meal.	154.8	5.3	-	-	16	1.4	1.4	24.7	17.7	15.5
719	Blood meal.	154.2	5.1	-	-	23	2.6	2.1	24.5	18.0	15.9
739	Blood meal.	158.0	0.9	-	-	16	.6	1.1	24.5	15.8	14.4
740	Blood meal.	154.9	12.6	-	-	14	1.0	1.5	24.7	17.8	15.8
741	Blood meal.	153.1	8.8	-	-	28	2.3	2.2	24.2	17.0	15.2
742	Blood meal.	158.7	1.9	-	-	15	2.4	2.4	24.3	16.8	15.1
792	Blood meal.	159.0	3.2	-	-	18	1.2	1.8	24.3	16.6	15.5
793	Blood meal.	153.6	31.6	-	-	16	.9	1.8	25.2	18.1	16.2
794	Blood meal.	149.6	2.3	-	-	22	1.0	1.5	23.5	15.3	14.0

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
795	Blood meal.	157.4	1.7	–	–	18	.5	1.4	24.5	15.3	14.3
817	Blood meal.	158.0	11.3	–	–	14	.3	1.4	24.8	17.1	15.8
599	Bone meal.	18.7	65.1	–	–	778	–	–	6.4	5.1	5.0
537	Brewer's dried grains.	39.0	63.4	198	–	47	–	–	20.6	7.9	7.4
562	Brewer's wet grains. freeze-dried.	46.6	75.8	142	–	45	–	–	21.4	10.3	9.8
	Brewer's yeast. See Yeast.										
519	Buckwheat. whole ground.	19.7	26.2	140	–	23	–	–	18.5	14.1	13.3
556	Buckwheat. whole ground, (cv. Mancan).	23.4	26.1	125	–	27	–	–	18.7	13.7	12.9
	Canola meal. See Rapeseed meal.										
606	Casein. vitamin-free, General Biochemicals.	145.4	–	–	–	57	–	–	24.2	20.5	18.7
604	Cellulose. Alphacel, Nutritional Biochemicals.	1.6	–	833	–	3	–	–	17.3	ND	ND
543	Cereal offal.	28.7	22.5	25	–	32	–	–	18.5	15.8	15.0
	Cerelose. See Glucose.										
643	Coconut meal.	37.2	28.8	–	597	72	1.6	10.8	18.8	11.4	10.8
363	Corn. ground, yellow.	22.1	48.7	21	–	18	–	–	19.0	17.4	–
380	Corn. ground, yellow.	15.7	39.8	23	–	14	–	–	18.3	16.8	–
387	Corn. ground, yellow.	17.6	43.0	21	–	17	–	–	18.9	17.3	–
436	Corn. ground, yellow.	13.5	40.6	27	–	15	–	–	18.8	16.6	16.1
563	Corn. ground, yellow.	13.2	36.6	23	–	13	–	–	18.4	16.4	15.9
838	Corn. ground, yellow.	16.2	39.8	–	13	14	.2	3.2	18.8	17.6	16.9
852	Corn. ground, yellow.	15.6	–	–	–	–	–	–	18.6	17.1	16.3
853	Corn. ground, yellow.	15.0	38.1	–	110	15	.1	3.4	18.9	17.0	16.6
855	Corn. ground, yellow.	16.8	29.2	–	111	15	.1	3.0	18.9	16.8	16.2
856	Corn. ground, yellow.	15.6	33.8	–	99	14	ND	3.4	18.8	17.4	16.4
857	Corn. ground, yellow.	16.5	20.4	–	98	12	.1	3.0	18.9	17.8	16.9
858	Corn. ground, yellow.	16.7	11.0	–	114	15	.1	3.6	18.9	17.3	16.5

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
859	Corn. ground, yellow.	17.2	43.8	-	125	16	.1	3.7	18.9	17.3	16.4
860	Corn. ground, yellow.	17.5	43.7	-	111	14	.1	3.5	19.1	18.0	17.0
861	Corn. ground, yellow.	17.3	32.8	-	130	15	.1	3.3	18.9	17.0	16.2
862	Corn. ground, yellow.	16.5	35.0	-	110	15	.1	3.6	18.9	16.7	16.1
470	Corn. ground, yellow, Quebec.	13.6	44.8	21	-	12	-	-	18.9	17.4	16.6
467	Corn. ground, yellow, No. 3, Ontario.	13.3	41.1	21	-	14	-	-	18.7	17.4	16.4
468	Corn. ground, yellow, No. 3, U.S.	14.1	42.9	22	-	14	-	-	18.8	17.6	16.6
469	Corn. ground, yellow, No. 3, U.S.	15.0	44.7	23	-	13	-	-	18.8	17.1	16.1
646	Corn germ meal.	38.1	67.8	-	308	21	.2	7.2	20.6	9.0	8.8
507	Corn gluten feed.	40.5	55.1	88	-	49	-	-	19.9	11.7	11.0
536	Corn gluten feed.	37.1	15.7	104	-	77	-	-	18.5	8.3	8.0
651	Corn gluten feed.	44.1	62.9	-	287	56	.6	9.8	20.5	12.4	11.6
674	Corn gluten feed.	33.4	38.9	-	310	49	.3	11.1	19.2	11.1	10.0
726	Corn gluten feed.	37.0	42.7	-	325	50	.7	10.4	19.4	10.1	9.1
727	Corn gluten feed.	39.0	42.0	-	286	49	.7	10.3	19.5	10.8	10.0
754	Corn gluten feed.	41.2	43.7	-	293	53	.2	11.5	19.7	10.3	9.8
755	Corn gluten feed.	40.1	42.0	-	333	55	.2	10.8	19.4	9.7	9.2
805	Corn gluten feed.	41.8	29.9	-	323	59	.3	11.2	19.4	11.0	10.6
806	Corn gluten feed.	40.3	39.0	-	355	54	.3	10.5	19.7	10.5	10.0
827	Corn gluten feed.	37.6	36.2	-	318	48	.3	10.5	19.4	10.2	9.6
828	Corn gluten feed.	34.4	7.4	-	257	58	.2	10.3	18.4	10.8	9.9
445	Corn gluten feed. flakes.	36.4	33.1	92	-	54	-	-	19.5	10.2	9.6
493	Corn gluten meal.	101.8	11.6	16	-	41	-	-	22.8	17.9	17.2
616	Corn gluten meal.	107.0	10.6	8	-	37	-	-	23.2	17.9	17.3
675	Corn gluten meal.	87.0	10.0	-	38	16	ND	5.3	22.0	18.5	17.3
725	Corn gluten meal.	112.7	7.9	-	12	18	.4	6.7	23.2	18.4	17.3
752	Corn gluten meal.	106.3	9.8	-	14	26	-	5.8	23.0	18.7	17.3
753	Corn gluten meal.	106.4	9.3	-	12	29	.2	5.9	22.8	18.6	17.3
807	Corn gluten meal.	112.5	11.7	-	ND	34	ND	5.2	23.3	18.1	17.2
808	Corn gluten meal.	118.6	12.3	-	ND	26	ND	5.3	23.7	18.2	17.2
829	Corn gluten meal.	110.6	15.1	-	5	15	ND	5.6	23.5	18.4	17.4
830	Corn gluten meal.	109.6	15.4	-	13	16	ND	4.8	24.0	19.1	17.7
831	Corn gluten meal.	107.6	3.6	-	7	15	ND	5.1	23.3	18.5	17.5
521	Corn starch. pearled.	1.0	1.8	4	-	ND	-	-	17.0	17.6	16.2
600	Corn starch. pearled.	.9	-	-	-	-	-	-	17.2	17.0	16.9

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
373	Cottonseed meal.	82.2	16.2	113	-	-	-	-	19.7	9.8	-
374	Cottonseed meal.	73.8	20.4	148	-	-	-	-	19.5	10.4	-
504	Crab meal. New Brunswick.	54.4	25.4	225	-	418	-	-	11.5	4.0	3.6
567	Distiller's dried grains.	48.7	138.4	102	-	52	-	-	23.2	14.8	13.8
510	Distiller's dried grains. corn.	47.7	31.1	100	-	44	-	-	22.5	13.4	13.3
501	Distiller's dried grains. with solubles.	45.2	92.1	101	-	45	-	-	22.2	12.8	12.4
540	Distiller's dried grains. with solubles.	43.8	78.6	105	-	48	-	-	21.8	12.7	12.2
561	Distiller's wet grains. freeze-dried.	66.8	69.6	214	-	11	-	-	22.6	11.8	10.7
601	Egg albumen solids. spray-dried, pasteurized.	132.6	-	-	-	70	-	-	22.0	16.3	15.7
596	Egg white. raw, spray-dried.	134.1	-	-	-	66	-	-	22.0	16.3	14.8
394	Feather meal.	129.2	53.0	-	-	34	-	-	23.3	16.1	-
477	Feather meal.	137.6	91.7	13	-	25	-	-	24.8	17.1	15.3
478	Feather meal.	143.1	56.0	13	-	18	-	-	24.2	15.7	14.0
500	Feather meal.	142.8	34.5	12	-	19	-	-	24.0	14.6	13.6
663	Feather meal.	131.6	111.4	-	136	32	8.5	5.7	24.8	17.4	15.6
664	Feather meal.	139.8	61.0	-	159	22	4.7	3.0	24.0	15.2	13.5
665	Feather meal.	143.0	80.9	-	292	23	3.4	5.2	24.5	15.6	14.0
714	Feather meal.	142.5	80.1	-	-	18	3.4	2.3	24.8	15.5	13.6
715	Feather meal.	141.7	84.3	-	-	16	3.1	1.9	24.7	17.0	14.7
716	Feather meal.	140.7	99.3	-	-	20	4.4	2.9	24.8	17.0	14.6
737	Feather meal.	142.4	77.6	-	-	22	3.7	2.4	24.4	15.2	13.6
738	Feather meal.	142.6	53.2	-	-	19	3.8	2.1	23.8	15.4	13.2
790	Feather meal.	143.2	85.5	-	-	18	3.8	2.7	24.7	15.8	14.2
791	Feather meal.	144.6	71.7	-	-	21	5.0	3.2	24.3	17.5	15.1
815	Feather meal.	141.1	90.9	-	-	28	3.9	2.9	24.8	15.6	14.0
816	Feather meal.	141.7	86.2	-	-	14	2.2	2.4	24.6	16.9	15.4
360	Fish meal.	96.9	72.8	5	-	246	-	-	18.3	13.4	-
389	Fish meal.	117.0	25.0	-	-	229	-	-	18.3	13.3	-
398	Fish meal.	102.6	-	-	-	-	-	-	17.2	12.3	11.5
662	Fish meal.	107.0	96.3	-	30	198	61.8	35.8	19.9	14.3	13.0
712	Fish meal.	106.7	72.2	-	-	248	77.7	60.4	18.8	14.0	12.2
713	Fish meal.	110.5	45.9	-	-	235	71.6	59.6	18.5	14.3	12.7

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
734	Fish meal.	117.6	119.4	-	-	130	34.6	22.8	22.3	17.0	15.6
735	Fish meal.	112.0	74.3	-	-	206	59.6	30.9	19.8	14.2	12.3
736	Fish meal.	108.5	56.5	-	-	241	74.6	58.6	18.9	14.0	12.3
788	Fish meal.	106.5	44.4	-	-	263	90.4	45.5	17.8	12.7	12.1
789	Fish meal.	109.0	106.7	-	-	203	65.8	38.4	20.7	16.6	15.0
814	Fish meal.	108.8	109.4	-	-	91	58.2	35.0	21.0	15.6	14.4
836	Fish meal.	117.6	50.6	-	23	171	54.1	31.9	20.4	14.0	12.8
527	Fish meal. 60% protein.	105.1	56.3	10	-	257	-	-	17.9	12.3	11.0
528	Fish meal. 66% protein.	100.3	20.3	17	-	319	-	-	15.8	10.4	9.2
441	Fish meal. Herring.	108.0	105.1	10	-	184	-	-	21.2	15.8	14.3
353	Fish meal. Menhaden.	107.2	79.2	4	-	198	-	-	20.0	13.8	-
354	Fish meal. Menhaden.	103.8	110.0	5	-	214	-	-	19.8	14.5	-
620	Fish meal. Menhaden.	111.0	119.0	9	-	210	58.2	35.4	20.6	16.1	14.1
621	Fish meal. Menhaden.	111.6	106.6	9	-	211	59.5	35.0	20.2	15.3	13.6
622	Fish meal. Menhaden.	117.0	138.2	6	-	190	52.9	31.1	21.2	16.5	14.6
623	Fish meal. Menhaden.	107.8	122.6	7	-	214	53.8	36.4	20.7	16.1	14.4
624	Fish meal. Menhaden.	112.6	111.6	7	-	209	58.5	32.0	20.6	15.7	13.9
625	Fish meal. Menhaden.	107.8	109.0	6	-	214	58.9	32.7	20.6	15.9	14.1
626	Fish meal. Menhaden.	115.8	109.2	5	-	198	48.1	30.4	20.2	15.5	13.4
627	Fish meal. Menhaden.	119.0	113.4	6	-	187	45.0	29.2	20.5	15.7	13.8
628	Fish meal. Menhaden.	117.4	113.1	6	-	189	47.5	30.6	20.3	15.6	13.6
629	Fish meal. Menhaden.	113.0	99.1	7	-	197	59.7	35.0	20.5	15.9	14.1
630	Fish meal. Menhaden.	109.8	106.4	7	-	210	53.6	30.3	20.3	15.5	13.7
631	Fish meal. Menhaden.	112.0	91.6	10	-	215	58.8	34.9	20.0	15.0	13.2
632	Fish meal. Menhaden.	106.3	166.1	9	-	163	38.7	25.5	21.6	16.9	15.0
633	Fish meal. Menhaden.	113.8	136.5	11	-	172	36.6	24.7	21.0	16.5	14.5
634	Fish meal. Menhaden.	110.7	113.9	10	-	176	31.3	23.1	20.5	15.6	13.9
635	Fish protein concentrate.	150.3	1.4	6	-	91	31.2	16.1	21.8	17.6	14.4
636	Fish protein concentrate.	143.0	1.1	6	-	99	34.0	16.8	21.5	17.5	14.4
581	Fish solubles.	102.6	123.0	ND	-	162	-	-	19.7	14.8	13.4
597	Gelatin. purified protein, Nutritional Biochemicals.	166.2	-	-	-	8	-	-	21.2	16.1	14.4
328	Glucose. monohydrate.	-	-	-	-	-	-	-	16.0	15.7	-
MS	Glucose. monohydrate.	-	-	-	-	-	-	-	15.4	15.9	-
605	Glucose. D-dextrose, anhydrous.	-	-	-	-	-	-	-	15.6	15.6	15.5

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
558	Lathyrus cicera. ground.	42.2	6.3	62	-	64	-	-	17.7	11.7	11.3
557	Lathyrus sativus. ground.	45.4	6.0	77	-	34	-	-	18.4	11.8	11.3
560	Lentils. ground, (cv. Eston).	41.8	8.4	55	-	35	-	-	18.5	12.8	12.2
559	Lentils. ground, (cv. Laird).	39.7	7.4	54	-	93	-	-	17.3	12.3	11.8
499	Linseed meal.	58.4	66.7	114	-	60	-	-	20.4	9.2	8.6
506	Linseed meal.	59.9	43.6	128	-	79	-	-	19.8	9.1	8.0
512	Linseed meal.	64.8	28.0	124	-	63	-	-	19.6	8.4	7.9
432	Lupin seed. ground, New Zealand.	49.3	57.2	171	-	37	-	-	19.7	9.4	8.9
362	Meat meal.	84.4	98.6	43	-	259	-	-	17.7	11.4	-
397	Meat meal.	86.4	126.0	-	-	248	-	-	19.5	13.1	-
444	Meat meal.	74.4	118.2	29	-	342	-	-	16.4	10.7	9.7
479	Meat meal.	89.5	99.6	28	-	268	-	-	17.8	12.8	11.2
480	Meat meal.	85.5	107.3	28	-	255	-	-	18.6	12.8	11.6
481	Meat meal.	85.5	128.8	30	-	253	-	-	19.0	12.5	11.7
482	Meat meal.	84.5	130.1	26	-	230	-	-	19.1	12.9	11.6
658	Meat meal.	83.0	133.2	-	159	254	89.8	50.8	19.1	13.1	12.1
659	Meat meal.	84.4	95.4	-	78	340	128.2	76.2	16.1	7.6	7.2
660	Meat meal.	80.5	108.1	-	39	328	108.5	69.7	16.9	11.2	10.2
661	Meat meal.	82.4	89.9	-	152	334	102.6	67.0	16.4	11.4	10.3
709	Meat meal.	79.0	163.1	-	-	279	95.6	58.8	19.2	12.5	11.3
710	Meat meal.	84.8	96.5	-	-	283	104.0	66.3	17.6	12.0	10.5
711	Meat meal.	81.1	113.5	-	-	332	110.9	68.4	17.0	12.1	10.7
731	Meat meal.	84.4	115.0	-	-	280	91.4	59.2	17.9	12.4	11.0
732	Meat meal.	84.0	112.0	-	-	292	100.9	60.5	17.3	11.4	10.2
733	Meat meal.	85.9	98.5	-	-	318	107.6	66.6	17.2	12.2	10.8
785	Meat meal.	82.3	128.8	-	-	281	91.1	53.7	18.5	12.3	11.3
786	Meat meal.	87.9	111.7	-	-	249	73.4	50.2	19.1	13.6	12.4
787	Meat meal.	79.2	96.9	-	-	322	74.4	65.1	16.3	10.9	9.9
812	Meat meal.	86.3	112.8	-	-	284	90.0	43.6	18.0	12.3	11.3
813	Meat meal.	82.5	90.6	-	-	327	107.3	55.0	16.5	11.2	10.0
598	Milk. skim, spray-dried powder.	56.2	-	-	-	84	-	-	18.0	11.9	11.2
570	Millet. ground, Indiana.	19.1	38.3	98	-	33	-	-	18.8	15.5	14.6

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
580	Milo. ground.	18.9	32.4	29	-	16	-	-	18.6	16.7	16.1
442	Molasses. dried.	7.7	4.4	127	-	111	-	-	16.2	6.8	6.9
382	Oats. whole ground.	25.1	42.0	95	-	30	-	-	18.5	14.3	-
388	Oats. whole ground.	21.0	41.0	105	-	30	-	-	19.3	14.3	-
420	Oats. whole ground.	-	-	-	-	-	-	-	19.8	13.8	-
421	Oats. whole ground.	-	-	-	-	-	-	-	19.8	14.7	-
437	Oats. whole ground.	16.1	47.6	145	-	29	-	-	19.8	12.8	12.9
533	Oats. whole ground.	18.9	53.0	117	-	28	-	-	19.5	13.3	12.9
699	Oats. whole ground.	18.4	43.8	-	334	28	.7	3.7	19.3	11.9	11.2
700	Oats. whole ground.	18.2	45.6	-	374	34	.8	3.3	19.3	11.9	11.2
701	Oats. whole ground.	17.9	46.4	-	349	29	.8	3.6	19.2	11.5	10.9
702	Oats. whole ground.	19.1	46.2	-	279	37	.8	7.0	19.1	12.9	12.2
703	Oats. whole ground.	22.9	41.0	-	305	31	.6	6.1	19.3	12.8	11.9
595	Oats. whole ground, (cv. Donald).	18.5	34.0	146	-	26	-	-	19.2	13.5	13.0
365	Oats. whole ground, (cv. Harmon).	19.7	52.2	108	-	33	-	-	19.2	13.1	-
364	Oats. whole ground, (cv. Hinoat).	26.4	39.8	119	-	30	-	-	19.3	13.0	-
594	Oats. whole ground, (cv. Woodstock).	23.4	38.8	145	-	36	-	-	19.3	13.4	12.7
764	Oats. whole ground, No. 2 CW, green, 50 kg/hL.	20.7	53.7	-	281	32	.7	2.9	19.7	13.4	12.9
774	Oats. whole ground, No. 2 CW, green, 50 kg/hL.	19.6	45.8	-	296	36	.8	5.6	19.2	13.1	12.6
770	Oats. whole ground, No. 2 CW, green, 53 kg/hL.	16.2	64.6	-	287	31	.7	2.7	19.6	13.5	13.3
760	Oats. whole ground, No. 1 feed, green, 51 kg/hL.	17.1	61.1	-	296	35	.8	3.2	19.5	13.4	12.7
759	Oats. whole ground, No. 2 feed, 44 kg/hL.	18.9	49.5	-	365	28	.7	3.2	19.4	12.3	11.9
771	Oats. whl. grd., No. 2 feed, 18% wheat, 50 kg/hL.	21.9	42.6	-	310	30	.9	3.2	19.4	13.3	12.8
422	Oats. hull-less, ground.	28.3	53.7	23	-	25	-	-	19.9	16.9	16.1
423	Oats. hull-less, ground.	31.2	50.1	23	-	25	-	-	19.8	16.5	15.9
424	Oats. hull-less, ground.	26.2	57.0	20	-	23	-	-	19.9	17.2	16.4
426	Oats. hull-less, ground.	26.2	55.4	23	-	21	-	-	19.8	17.0	16.4
590	Oats. hull-less, ground.	30.9	59.9	29	-	23	-	-	19.8	16.6	16.0
591	Oats. hull-less, ground.	29.8	55.1	27	-	23	-	-	19.8	16.5	15.9
592	Oats. hull-less, ground.	30.0	54.0	27	-	23	-	-	19.7	16.8	16.2
593	Oats. hull-less, ground.	30.6	49.9	29	-	24	-	-	19.7	16.6	16.0
842	Oats. hull-less, ground.	31.8	63.7	-	-	-	-	-	19.8	17.6	16.8
589	Oats. hull-less, ground, (cv. Terra).	29.1	48.2	28	-	24	-	-	19.5	16.3	15.8
385	Oat groats. ground, Eastern Canada.	24.0	22.8	34	-	44	-	-	19.8	16.9	-
384	Oat grouts. ground, Western Canada.	21.2	22.4	37	-	66	-	-	19.8	17.7	-

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
425	Oats, wild. dehulled, ground.	29.0	85.3	35	-	23	-	-	21.1	17.9	16.9
573	Peanut hulls. ground.	13.9	18.5	539	-	91	-	-	18.8	4.6	4.5
352	Peanut hulls. ground, skins.	24.6	164.0	116	-	26	-	-	22.0	13.7	-
575	Peanut meal.	86.0	6.8	74	-	50	-	-	19.6	12.2	11.2
517	Peas. whole ground.	38.8	10.5	74	-	31	-	-	18.3	12.7	12.1
553	Peas. whole ground, (cv. Century).	43.1	9.5	65	-	27	-	-	18.5	12.7	12.2
552	Peas. whole ground, (cv. Tara).	36.1	9.5	78	-	31	-	-	18.3	12.8	12.5
551	Peas. whole ground, (cv. Trapper).	41.7	10.8	73	-	30	-	-	18.6	12.7	12.1
550	Peas. whole ground, (cv. Triumph).	39.9	9.5	63	-	29	-	-	18.4	13.2	12.8
386	Potato waste. dried, ground.	12.1	70.2	40	-	40	-	-	18.8	15.7	-
494	Potato waste. dried, ground.	13.9	74.1	44	-	30	-	-	19.4	15.5	15.1
502	Poultry by-product meal.	104.7	163.6	17	-	135	-	-	22.9	16.9	15.5
518	Poultry by-product meal.	106.5	128.2	27	-	133	-	-	22.2	15.6	14.3
525	Rapeseed. small seed, screenings[4].	31.7	142.7	178	-	52	-	-	22.5	14.6	13.8
524	Rapeseed. whole ground, (cv. Candle).	35.6	270.7	244	-	42	-	-	28.0	15.2	14.6
303	Rapeseed. whole ground, (cv. Tower).	-	-	-	-	-	-	-	27.9	19.7	-
523	Rapeseed. whole ground, (cv. Tower).	36.0	319.7	222	-	39	-	-	28.6	17.0	16.3
526	Rapeseed dockage[5].	24.7	91.2	204	-	72	-	-	19.9	9.5	9.0
395	Rapeseed meal.	63.0	40.1	106	-	79	-	-	19.8	10.2	-
443	Rapeseed meal.	58.8	23.9	127	-	74	-	-	19.9	9.1	8.3
485	Rapeseed meal.	55.9	101.8	111	-	71	-	-	21.1	11.2	10.6
486	Rapeseed meal.	67.8	27.0	121	-	57	-	-	20.0	9.9	9.2
487	Rapeseed meal.	64.6	28.1	125	-	71	-	-	20.0	9.4	9.0
488	Rapeseed meal.	65.2	21.4	113	-	77	-	-	19.8	9.1	8.5
796	Rapeseed meal.	62.1	20.9	-	358	78	7.5	12.7	20.1	10.4	9.6
797	Rapeseed meal.	61.1	31.3	-	342	79	7.4	12.4	19.9	10.0	9.1
798	Rapeseed meal.	59.4	31.0	-	388	75	7.9	12.3	20.4	10.7	9.7
818	Rapeseed meal.	65.0	18.5	-	-	76	7.1	13.6	19.5	9.6	9.0
819	Rapeseed meal.	60.6	34.8	-	305	80	7.8	13.0	19.6	9.5	8.8

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
820	Rapeseed meal.	66.8	27.1	-	301	74	6.4	13.1	20.1	10.7	10.0
821	Rapeseed meal.	61.5	32.6	-	308	79	8.0	13.1	19.6	9.5	8.6
822	Rapeseed meal.	59.5	18.7	-	302	82	8.2	12.8	19.4	10.1	9.2
322	Rapeseed meal. (cv. Tower).	-	-	-	-	-	-	-	19.9	12.8	-
522	Rapeseed meal. Canola.	67.6	23.2	133	-	71	-	-	19.8	9.6	8.9
668	Rapeseed meal. Canola.	64.3	16.4	-	253	74	7.0	14.8	19.7	9.6	8.6
669	Rapeseed meal. Canola.	61.4	45.8	-	257	70	6.9	13.7	20.1	9.5	8.6
670	Rapeseed meal. Canola.	63.5	31.8	-	257	73	6.9	14.8	19.7	9.6	8.8
720	Rapeseed meal. Canola.	67.3	25.2	-	254	72	6.5	13.9	19.8	9.9	8.7
721	Rapeseed meal. Canola.	64.8	10.6	-	241	76	6.9	13.6	19.3	10.0	8.7
722	Rapeseed meal. Canola.	66.8	23.3	-	235	76	7.6	13.6	19.8	10.6	9.0
743	Rapeseed meal. Canola.	63.8	22.2	-	241	72	6.8	12.9	19.7	10.3	9.2
744	Rapeseed meal. Canola.	71.6	27.6	-	221	72	6.1	13.2	19.8	10.4	9.2
745	Rapeseed meal. Canola.	61.9	33.9	-	234	75	8.2	13.4	19.6	10.1	8.9
746	Rapeseed meal. Canola.	68.8	37.7	-	232	72	6.0	13.3	20.1	10.8	9.5
747	Rapeseed meal. Canola.	71.3	21.4	-	220	72	5.8	13.2	19.8	10.4	9.2
579	Rice bran.	23.2	161.8	122	-	104	-	-	20.9	14.2	13.6
641	Rice bran.	21.6	110.8	-	175	91	3.5	18.8	19.6	14.7	14.0
642	Rice bran.	23.3	167.0	-	275	107	1.3	23.7	22.6	14.0	14.0
647	Rice bran.	25.1	116.8	-	186	68	.6	13.5	20.4	15.0	14.6
648	Rice bran. infested with weevils.	25.1	140.0	-	222	118	.9	28.2	20.4	12.3	12.0
644	Rice bran. perboiled.	27.0	319.3	-	336	112	1.6	27.0	24.5	14.6	14.1
571	Rice bran. polish.	23.2	132.6	52	-	80	-	-	20.2	15.1	14.8
587	Rye. whole ground.	20.2	10.3	28	-	16	-	-	18.4	14.5	14.0
554	Rye. whole ground, (cv. Carman).	24.2	14.9	34	-	18	-	-	18.4	15.0	14.4
585	Rye. whole ground, (cv. Cougar).	17.5	11.6	31	-	17	-	-	18.3	14.4	13.9
390	Rye. whole ground, (cv. Gazelle).	19.5	13.0	26	-	16	-	-	18.3	15.3	-
582	Rye. whole ground, (cv. Kodiak).	19.6	11.3	32	-	19	-	-	18.3	14.1	13.5
584	Rye. whole ground, (cv. Musketeer).	18.8	10.5	30	-	17	-	-	18.2	14.1	13.9
555	Rye. whole ground, (cv. Puma).	21.7	12.1	25	-	17	-	-	18.3	14.4	13.9
586	Rye. whole ground, (cv. Puma).	19.1	11.6	31	-	19	-	-	18.3	13.9	13.6
704	Screenings.	31.7	149.7	-	421	67	5.8	8.2	22.4	13.2	12.4
705	Screenings.	25.5	140.6	-	401	67	5.2	6.6	21.2	12.0	11.2
706	Screenings.	24.3	33.7	-	152	23	.8	6.1	18.6	15.1	14.2
707	Screenings.	18.3	37.4	-	520	118	2.8	3.4	17.6	6.9	6.4

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
708	Screenings.	21.5	51.1	..	390	45	1.1	3.5	19.5	11.9	10.9
569	Screenings. feed.	17.9	16.0	148	-	63	-	-	18.1	8.9	8.6
568	Screenings. No. 1 feed.	24.6	30.9	50	-	22	-	-	19.0	14.5	13.7
576	Sesame seed meal.	75.0	47.1	78	-	129	-	-	18.7	10.7	9.5
639	Sesame seed meal.	75.3	12.7	-	198	161	29.5	16.8	17.1	8.6	8.2
645	Sesame seed meal.	73.7	30.8	-	200	174	31.4	16.5	17.3	9.6	9.0
678	Shrimp meal.	64.5	4.2	-	273	389	138.8	28.8	13.0	5.8	5.1
840	Single cell protein. Pruteen.	121.2	16.6	-	2	109	12.5	29.6	21.2	15.2	13.7
447	Soybean, whole seeds.	62.9	207.5	59	-	50	-	-	23.8	12.8	12.1
448	Soybean, whole seeds. rolled.	64.5	205.9	61	-	50	-	-	23.5	14.8	13.9
383	Soybean flakes. solvent extracted, raw.	86.5	10.6	44	..	64	..	..	19.8	9.9	..
446	Soybean hulls. ground.	26.6	25.0	357	-	48	-		18.2	4.6	4.2
327	Soybean meal.	-	-	-	-	-	-	-	19.4	13.4	-
368	Soybean meal.	-	-	-	-	-	-	-	19.5	13.0	-
393	Soybean meal.	91.0	6.0	43	-	67	-	-	19.8	12.8	-
399	Soybean meal.	88.5	-	-	-	-	-	-	19.9	12.8	12.1
489	Soybean meal.	78.9	61.3	35	-	65	-	-	20.7	13.6	12.8
490	Soybean meal.	78.7	14.8	55	-	65	-	-	19.7	11.4	10.6
491	Soybean meal.	81.3	39.0	43	-	66	-	-	20.0	12.2	11.5
492	Soybean meal.	82.8	6.6	40	-	67	-	-	19.7	12.0	11.2
608	Soybean meal.	75.0	12.6	94	-	64	..	-	19.5	11.2	10.4
671	Soybean meal.	86.7	14.3	-	53	64	2.4	10.7	19.7	12.0	11.1
672	Soybean meal.	85.9	18.6	-	61	68	3.2	9.0	19.7	11.9	11.4
673	Soybean meal.	84.7	17.1	-	82	66	2.6	9.0	19.8	12.8	11.6
723	Soybean meal.	87.0	11.1	-	73	64	2.1	8.6	19.8	12.4	11.2
724	Soybean meal.	85.1	11.7	-	64	65	2.4	9.3	19.5	13.3	11.9
748	Soybean meal.	87.0	11.7	..	56	64	2.1	8.8	19.7	12.3	11.0
749	Soybean meal.	85.8	7.6	-	68	69	3.0	8.6	19.5	12.3	11.1
750	Soybean meal.	88.1	8.8	-	63	65	2.5	9.3	19.8	13.1	11.9
751	Soybean meal.	85.7	17.8	..	46	73	2.6	8.6	19.8	12.7	11.7
799	Soybean meal.	86.0	10.5	-	108	66	3.0	8.0	19.8	13.0	12.0

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
800	Soybean meal.	89.7	59.2	-	132	67	2.5	9.1	19.8	12.6	11.4
801	Soybean meal.	86.9	10.0	-	110	66	2.5	8.8	19.7	12.4	11.2
802	Soybean meal.	87.7	10.0	-	161	69	3.9	7.6	19.7	12.6	11.7
803	Soybean meal.	88.5	6.8	-	119	66	2.7	8.8	19.6	12.5	11.4
804	Soybean meal.	88.2	9.4	-	154	68	2.5	9.1	19.8	12.8	11.8
823	Soybean meal.	86.9	18.1	-	112	68	3.2	8.2	19.7	12.4	11.5
824	Soybean meal.	91.0	3.8	-	101	67	2.6	9.5	19.7	13.5	12.3
825	Soybean meal.	90.0	8.4	-	112	65	2.6	9.6	19.9	13.2	12.0
826	Soybean meal.	88.5	7.3	-	114	63	2.5	9.4	19.9	12.5	11.4
837	Soybean meal.	87.3	18.0	-	69	65	2.8	9.8	19.6	12.1	11.2
505	Sunflower seed meal.	66.4	24.0	189	-	79	-	-	19.4	9.4	8.9
516	Sunflower seed meal.	72.7	23.7	153	-	81	-	-	19.4	10.5	9.7
566	Sunflower seed meal.	78.2	14.9	128	-	88	-	-	19.3	10.4	9.2
MS	Sunflower seed meal.	74.8	16.0	108	-	79	-	-	19.7	10.8	-
513	Triticale. whole ground.	27.7	19.9	37	-	21	-	-	18.6	15.2	14.4
514	Triticale. whole ground.	27.2	17.0	41	-	20	-	-	18.6	15.2	14.6
515	Triticale. whole ground.	24.9	9.6	31	-	16	-	-	18.4	15.6	15.0
583	Triticale. whole ground.	26.8	15.5	38	-	18	-	-	18.2	14.6	14.1
427	Triticale. whole ground, (cv. Palouse).	-	-	-	-	-	-	-	18.2	14.7	-
588	Triticale. whole ground, (cv. Welsh).	26.4	11.1	39	-	20	-	-	18.4	14.9	14.3
361	Wheat. whole ground.	23.5	27.7	39	-	23	-	-	18.5	15.6	-
381	Wheat. whole ground.	25.7	17.5	30	-	20	-	-	18.0	15.8	-
400	Wheat. whole ground.	25.8	-	-	-	-	-	-	18.6	15.0	14.6
471	Wheat. whole ground.	27.1	19.0	26	-	18	-	-	18.7	16.5	15.6
472	Wheat. whole ground.	24.9	15.8	17	-	25	-	-	18.7	16.2	15.2
679	Wheat. whole ground.	30.0	16.3	-	117	21	.4	7.2	18.7	15.6	15.0
680	Wheat. whole ground.	29.8	21.8	-	72	21	.3	7.2	18.7	15.3	14.8
681	Wheat. whole ground.	30.5	16.4	-	114	18	.3	6.1	18.7	15.7	15.0
682	Wheat. whole ground.	27.3	15.1	-	112	20	.4	6.6	18.6	15.1	14.5
683	Wheat. whole ground.	24.0	16.6	-	125	19	.3	6.1	18.4	15.3	14.7
684	Wheat. whole ground.	28.9	20.4	-	94	22	.4	6.9	18.6	14.9	14.5
685	Wheat. whole ground.	30.4	15.8	-	132	21	.4	6.4	18.7	15.3	14.7
686	Wheat. whole ground.	27.5	22.4	-	94	21	.5	6.8	18.6	15.3	14.8
687	Wheat. whole ground.	29.0	15.4	-	127	22	.4	7.0	18.5	15.6	15.0
688	Wheat. whole ground.	30.9	14.2	-	139	20	.3	7.0	18.6	15.1	14.7

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
366	Wheat. whole ground, (cv. Glenlea).	28.4	16.0	26	-	20	-	-	18.4	15.8	-
391	Wheat. whole ground, (cv. Glenlea).	26.2	15.0	25	-	18	-	-	18.6	16.4	-
418	Wheat. whole ground, Australian, (cv. Cootamundra).	-	-	-	-	-	-	-	18.5	15.8	-
417	Wheat. whole ground, Australian, (cv. Dubba).	-	-	-	-	-	-	-	18.6	15.7	-
419	Wheat. whole ground, Australian, (cv. Gunnedah).	-	-	-	-	-	-	-	18.4	15.3	-
416	Wheat. whole ground, Australian, (cv. Wagga).	-	-	-	-	-	-	-	18.4	15.5	-
428	Wheat. whole ground, purple.	-	-	-	-	-	-	-	18.5	15.3	-
773	Wheat. whole ground, No. 1 CW, Red Spring.	31.7	15.6	-	134	22	.5	6.1	18.6	15.0	14.4
778	Wheat. whole ground, No. 1 CW, Red Spring.	32.0	16.3	-	144	20	.3	6.5	18.8	15.7	14.9
784	Wheat. whole ground, No. 1 CW, Red Spring.	27.6	16.2	-	103	19	.6	5.3	18.6	15.7	15.0
779	Wheat. whl. grd., No. 1 CW, Red Spring, 78 kg/hL.	28.9	15.8	-	128	20	.4	5.8	18.7	15.6	14.8
782	Wheat. whl. grd., No. 1 CW, Red Spring, 80 kg/hL.	28.6	15.5	-	132	20	.6	6.3	18.6	15.5	14.9
783	Wheat. whl. grd., No. 2 CW, Red Spring, 77 kg/hL.	28.8	15.5	-	133	21	.5	6.5	18.7	16.1	15.4
772	Wheat. whl. grd., No. 2 CW, R. S., 37% vitr. kern.	26.2	15.4	-	138	21	.6	5.8	18.6	15.3	14.8
781	Wheat. whl. grd., No. 2 CW, R. S., 4% midge damage.	27.9	15.0	-	119	21	.6	5.8	18.6	15.5	14.7
776	Wheat. whl. grd., No. 2 CW, R. S., immat. shrunken.	37.3	14.3	-	142	23	.6	6.4	18.9	15.3	14.7
780	Wheat. whl. grd., No. 3 CW, R. S., 20% vitr. kern.	31.2	15.1	-	82	22	.5	6.0	18.7	15.9	15.1
438	Wheat bran.	27.2	37.7	122	-	63	-	-	19.0	9.0	8.7
542	Wheat bran. Ontario wheat.	25.2	27.7	131	-	66	-	-	18.9	8.1	7.5
520	Wheat middlings.	26.7	39.3	95	-	27	-	-	19.1	14.0	14.2
539	Wheat middlings. Ontario wheat.	25.7	42.4	37	-	26	-	-	18.9	15.0	13.5
439	Wheat shorts.	24.9	32.1	86	-	52	-	-	19.0	11.7	11.2
509	Wheat shorts.	30.6	41.4	56	-	35	-	-	18.9	10.8	9.4
511	Wheat shorts.	30.6	44.1	112	-	51	-	-	19.3	10.6	9.0
676	Wheat shorts.	30.0	12.4	-	347	52	1.0	13.1	19.2	10.5	9.7
677	Wheat shorts.	31.5	34.2	-	310	54	1.1	14.0	19.6	10.8	9.8
728	Wheat shorts.	30.8	41.8	-	345	53	.8	11.4	19.2	10.6	9.9
729	Wheat shorts.	32.1	48.5	-	324	57	.9	12.7	19.3	10.5	9.6
730	Wheat shorts.	31.5	44.5	-	292	55	1.0	12.2	19.2	10.6	9.7
756	Wheat shorts.	30.2	39.3	-	292	49	.8	11.2	19.2	10.8	10.0
757	Wheat shorts.	29.9	41.6	-	281	45	.9	10.2	19.2	11.2	10.6
758	Wheat shorts.	29.9	45.9	-	340	56	.8	12.2	19.1	9.9	8.9
809	Wheat shorts.	31.5	34.8	-	332	56	.8	11.9	19.3	9.8	9.4
810	Wheat shorts.	30.5	31.7	-	336	54	.8	12.6	19.0	10.2	9.4
811	Wheat shorts.	31.6	42.1	-	321	54	.9	12.5	19.4	10.7	10.3

TABLE 1 cont.

Code	Description of Feedingstuff	Nitrogen	Ether Extract	Crude Fibre	Neutral Detergent Fibre	Ash	Calcium	Total Phos-phorus	Gross Energy	TME	TME_n
832	Wheat shorts.	31.4	35.9	-	270	51	.8	11.4	19.3	10.8	9.9
833	Wheat shorts.	31.4	33.1	-	315	52	.8	11.2	19.2	11.3	10.2
834	Wheat shorts.	31.1	40.5	-	340	55	.8	11.5	19.4	10.7	9.8
835	Wheat shorts.	31.6	39.8	-	326	56	.9	12.6	19.5	10.5	9.6
508	Whey powder.	19.6	2.2	4	-	89	-	-	15.4	5.8	2.7
535	Whey powder.	20.3	2.5	3	-	94	-	-	15.5	5.9	3.1
602	Yeast. dried.	82.0	1.5	80	-	78	-	-	21.2	13.5	13.4
503	Yeast. dried, brewer's.	72.0	4.0	55	-	104	-	-	19.5	11.2	10.4
541	Yeast. dried, brewer's.	64.2	6.9	57	-	82	-	-	18.9	12.8	12.0
574	Yeast. dried, brewer's.	63.2	30.3	65	-	84	-	-	19.4	12.8	11.6
572	Yucca. dried.	6.0	1.2	175	-	48	-	-	16.9	10.9	10.5
638	Yucca. dried.	3.2	4.4	-	260	19	5.6	.5	17.3	9.6	10.1
640	Yucca. dried.	2.3	4.1	-	57	32	1.1	.8	16.5	15.6	15.2

[1] Blanks (-) = variable not measured; ND = variable not detected in a reportable amount.

[2] 1 MJ = .239 Mcal.

[3] Space limitations make the following abreviations necessary:
cv. = cultivar
immat. = immature
inf. var. = inferior variety or varieties
R. S. = Red Spring
vitr. kern. = vitreous kernels
whl. grd. = whole ground

[4] By microscopic analysis found to contain: lambsquarter and red root pig weeds 53%; brassica sp. 37%; stink weed 8%; miscellaneous 2%.

[5] By microscopic analysis found to contain: empty seed pods, stems, chaff 32%; wild oats 27%; rapeseed 25%; wheat and barley 9%; lambsquarter, red root pig weeds with trace of stickseed and seeds of compositae family 4%; wild buckwheat 1%; injurious weeds 1%; rodent excreta 1%.

TABLE 2

Total amino acids in the dry matter of several feedingstuffs (g/kg)[1]

Code	Description	ALA	ARG	ASP	CYS	GLU	GLY	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
655	Alfalfa.	7.4	6.4	21.8	2.4	13.9	6.6	3.2	5.3	10.1	7.6	2.5	6.8	13.1	7.4	6.7	4.2	7.3
656	Alfalfa.	9.4	9.4	25.6	-	17.9	8.3	3.8	6.9	13.5	9.3	-	8.8	13.3	8.9	8.2	5.5	9.0
653	Alfalfa.	7.6	6.6	24.5	2.3	14.6	7.0	3.3	5.6	10.5	7.9	2.0	7.2	12.2	7.8	6.9	4.3	7.6
839	Alfalfa.	10.5	7.4	21.3	4.3	14.2	7.6	3.7	5.8	11.2	8.8	2.3	7.2	8.2	7.6	6.9	4.7	7.2
657	Alfalfa.	8.7	7.5	23.2	2.2	15.2	7.6	4.0	6.2	11.7	8.5	2.4	7.8	11.7	8.1	7.4	4.7	8.2
652	Alfalfa.	8.7	7.7	23.3	2.3	15.6	7.6	4.0	6.2	11.7	8.6	2.6	7.7	11.4	8.1	7.5	4.6	8.0
654	Alfalfa.	9.0	7.8	23.4	4.4	15.5	7.9	4.0	6.1	12.0	8.9	2.6	7.8	9.7	8.2	7.6	4.9	8.1
649	Algae.	34.7	24.0	40.4	12.2	39.1	22.9	6.0	14.5	33.3	21.5	8.8	19.6	20.3	17.7	21.7	13.9	22.4
650	Algae.	31.4	22.7	39.7	11.3	39.1	21.8	5.8	15.0	33.0	19.1	8.4	19.5	19.7	16.9	20.2	13.3	22.3
689	Barley.	5.4	7.2	8.7	3.3	34.9	5.5	3.4	4.3	9.4	5.7	2.3	6.8	14.6	6.3	4.7	4.3	5.7
690	Barley.	5.1	6.3	9.0	4.1	31.3	5.2	3.0	3.9	8.9	5.0	2.0	6.3	13.1	5.4	4.3	3.6	4.8
691	Barley.	3.8	5.1	7.6	2.5	20.4	4.0	2.3	2.8	6.4	3.9	1.9	4.1	8.2	4.0	3.3	2.4	3.2
692	Barley.	5.0	6.7	9.1	3.1	30.8	5.1	3.0	4.0	8.7	4.8	2.2	6.2	13.1	5.3	4.3	3.5	4.9
693	Barley.	4.5	5.6	8.5	2.9	25.6	4.6	2.6	3.3	7.6	4.4	1.7	4.9	10.6	4.6	3.8	3.0	4.2
694	Barley.	4.6	6.0	8.8	2.9	26.7	4.8	2.8	3.4	7.8	4.7	1.5	5.3	11.1	4.9	3.8	3.1	4.2
695	Barley.	5.1	7.3	9.5	3.8	33.7	5.4	3.2	4.3	9.2	5.1	2.5	6.7	14.6	5.8	4.6	3.9	4.8
696	Barley.	4.8	6.6	9.2	3.4	30.1	5.0	2.9	3.7	8.4	4.9	2.4	5.9	11.9	6.7	4.2	3.4	4.7
697	Barley.	4.7	6.6	9.3	3.0	29.5	5.0	3.0	3.8	8.6	4.8	3.6	6.0	12.4	5.2	4.3	3.3	4.7
698	Barley.	5.9	8.7	10.5	3.0	37.3	6.0	3.4	5.0	10.6	5.8	2.3	8.1	17.2	6.3	5.0	4.4	7.0
769	Barley.	5.6	7.4	8.9	3.4	35.1	5.7	3.4	4.5	10.0	5.4	2.2	7.6	15.8	6.2	4.8	4.4	6.3
765	Barley.	5.2	6.7	7.9	3.2	28.7	5.2	3.0	4.1	8.7	4.9	2.0	6.2	12.7	5.1	4.2	3.8	5.6
762	Barley.	5.8	7.3	8.9	3.3	34.3	5.7	3.3	4.6	9.9	5.3	2.2	7.2	15.5	6.3	4.9	4.4	6.4
775	Barley.	4.5	5.7	7.2	3.0	23.5	4.6	2.6	3.2	7.4	4.3	1.8	5.0	10.3	4.6	3.7	3.1	4.6
777	Barley.	5.7	7.4	8.8	4.0	41.4	5.6	3.5	4.9	10.9	5.2	2.7	8.4	19.5	6.6	4.8	4.9	6.8
767	Barley.	4.4	5.7	7.0	3.0	22.4	4.4	2.5	3.4	7.2	4.3	1.7	5.0	9.7	4.5	3.6	3.1	4.7
768	Barley.	4.7	5.7	7.3	3.1	26.2	4.5	2.6	3.6	7.8	4.3	1.8	5.5	11.5	4.9	3.8	3.2	5.1
761	Barley.	5.0	6.4	8.5	3.4	28.8	5.0	2.9	3.6	8.4	4.7	2.0	6.0	12.7	5.6	4.3	3.7	5.0
763	Barley.	4.9	6.1	7.8	2.9	27.1	4.9	2.8	3.8	8.2	4.6	1.9	5.8	11.9	5.2	4.1	3.5	5.3
766	Barley.	6.3	8.5	9.8	3.6	42.0	6.3	3.8	5.4	11.6	6.0	2.4	9.1	19.7	7.1	5.3	5.1	7.4
666	Blood meal.	73.3	52.8	111.8	18.9	100.2	49.4	55.8	17.6	120.7	79.9	8.5	63.9	50.3	57.9	42.2	31.1	73.8
667	Blood meal.	94.0	49.9	128.5	11.9	100.8	49.9	73.4	8.6	143.9	104.8	13.2	81.7	43.5	58.7	51.4	33.6	94.3
717	Blood meal.	79.6	40.5	105.3	10.6	87.1	40.8	58.1	6.8	120.9	89.9	14.0	70.4	35.9	53.7	48.4	30.0	70.8
718	Blood meal.	68.1	47.0	104.5	17.6	93.5	45.2	53.6	15.3	112.8	76.5	9.4	59.4	40.6	54.2	39.3	28.5	69.0
719	Blood meal.	72.4	42.9	101.1	13.6	87.2	40.5	56.3	11.8	112.3	82.8	12.6	62.2	35.7	49.0	43.2	29.2	65.3
739	Blood meal.	76.9	40.2	100.6	12.1	85.6	39.2	56.8	6.8	117.8	87.8	14.3	67.9	36.0	51.9	47.3	29.6	69.4

TABLE 2 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	GLY	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
740	Blood meal.	69.7	45.7	101.2	17.0	90.6	43.5	55.5	14.7	111.9	77.4	9.3	58.9	39.6	50.4	38.0	28.2	68.7
741	Blood meal.	72.7	42.0	99.9	12.4	87.8	40.7	56.6	10.5	114.1	82.4	11.6	62.8	35.4	48.7	42.5	29.2	68.8
742	Blood meal.	76.4	41.8	103.9	11.8	85.4	41.9	61.7	8.1	119.1	86.7	11.4	65.9	35.4	47.8	41.4	27.7	71.1
792	Blood meal.	80.4	49.3	116.4	11.8	93.9	42.7	68.3	8.5	132.6	95.4	11.7	73.4	39.4	53.6	45.7	30.9	78.5
793	Blood meal.	71.4	53.7	109.0	17.3	97.6	43.8	59.5	15.8	120.8	82.1	9.5	64.3	43.2	56.1	41.3	30.4	72.5
794	Blood meal.	74.4	49.3	114.9	13.7	95.9	44.5	60.7	10.6	122.8	84.2	8.5	64.1	37.9	47.6	37.0	27.7	71.9
795	Blood meal.	78.1	46.2	108.8	12.4	91.8	38.8	61.1	7.4	126.1	94.4	14.4	73.8	37.6	56.0	50.7	31.5	73.6
817	Blood meal.	76.5	53.5	111.7	16.3	98.4	47.5	62.5	14.3	125.2	85.5	8.8	65.2	42.3	55.2	40.7	31.1	77.3
643	Coconut meal.	9.1	28.7	18.6	4.6	39.3	9.5	3.9	6.7	12.4	7.1	4.9	9.7	7.8	9.5	6.3	5.0	10.3
838	Corn.	7.6	5.2	7.7	2.5	18.1	3.9	2.9	3.0	12.2	3.2	2.3	4.7	9.3	4.8	3.6	4.0	4.4
853	Corn.	7.4	5.0	7.6	2.6	18.8	3.8	3.1	3.0	12.6	3.5	2.2	4.5	9.2	4.6	3.6	4.0	4.1
855	Corn.	7.6	5.6	7.6	3.0	19.5	3.8	3.2	3.3	13.4	3.3	2.4	4.9	9.9	4.8	3.7	4.0	4.6
856	Corn.	7.8	5.4	7.8	3.0	19.8	3.9	3.2	3.3	13.6	3.4	1.6	5.0	10.1	4.9	3.9	4.3	4.6
857	Corn.	8.9	6.2	8.3	2.9	22.3	4.3	3.5	3.8	15.2	3.7	2.6	5.6	11.3	5.5	4.2	4.7	5.2
858	Corn.	8.0	5.5	7.7	2.7	20.1	4.0	3.3	3.6	13.8	3.4	2.3	5.1	10.3	4.8	3.7	4.4	4.8
859	Corn.	8.7	5.7	7.9	2.9	21.2	4.0	3.3	3.7	14.5	3.3	2.6	5.4	10.7	5.0	4.0	4.5	5.1
860	Corn.	8.4	5.5	8.0	2.9	21.5	4.0	3.3	3.6	14.9	3.4	2.5	5.4	10.8	5.2	3.9	4.6	5.0
861	Corn.	8.2	5.7	7.7	2.8	20.9	4.0	3.3	3.5	14.1	3.4	2.5	5.3	10.0	5.3	4.0	4.5	4.9
862	Corn.	7.5	5.5	7.4	2.6	19.0	3.7	3.1	3.3	13.2	3.3	2.5	4.8	9.5	4.5	3.6	4.1	4.6
646	Corn germ meal.	13.9	16.3	17.3	4.4	32.2	14.0	7.4	7.4	18.1	10.1	4.1	10.1	13.0	11.2	8.7	7.0	12.5
651	Corn gluten feed.	22.2	11.2	17.6	5.9	47.5	9.7	6.9	8.3	33.2	7.0	5.3	13.3	24.9	13.5	9.6	10.6	11.8
674	Corn gluten feed.	15.3	11.3	15.8	4.9	35.2	9.9	7.1	6.3	21.7	7.9	3.5	8.6	18.4	10.2	8.3	6.7	10.1
726	Corn gluten feed.	14.1	11.6	14.8	5.4	32.2	9.8	6.7	6.4	19.7	7.6	3.8	8.4	17.1	9.9	7.7	6.4	9.9
727	Corn gluten feed.	14.9	12.3	15.4	5.5	34.2	10.4	6.9	6.7	20.5	7.7	4.2	8.9	17.5	10.5	8.4	6.7	10.5
754	Corn gluten feed.	17.0	13.5	17.5	6.4	39.4	11.3	7.6	6.8	23.6	8.1	4.7	9.7	21.1	12.0	9.2	8.1	11.1
755	Corn gluten feed.	16.8	12.9	17.4	6.4	38.7	11.0	7.6	6.8	23.3	8.1	4.7	9.5	21.3	11.6	9.1	7.7	11.1
805	Corn gluten feed.	17.6	14.2	18.5	6.3	42.0	11.4	8.2	7.5	25.5	8.8	4.8	9.9	22.2	11.7	9.3	8.2	11.8
806	Corn gluten feed.	16.5	13.6	17.9	6.2	39.7	11.1	7.9	7.2	23.7	8.7	4.6	9.5	20.6	11.4	9.2	7.6	11.3
827	Corn gluten feed.	15.0	12.8	16.4	5.6	34.8	10.1	7.3	6.8	21.4	8.0	4.4	8.7	18.8	10.1	8.1	7.2	10.5
828	Corn gluten feed.	15.5	10.7	15.2	5.9	36.8	9.0	7.2	5.9	22.5	7.2	4.1	8.1	21.3	10.3	8.2	7.3	9.1
675	Corn gluten meal.	54.7	19.0	38.2	10.1	135.5	15.8	11.6	21.7	102.5	9.7	13.1	38.1	58.4	33.4	20.3	31.2	24.5
725	Corn gluten meal.	60.5	21.3	43.1	14.1	151.7	18.0	13.7	23.5	114.6	11.7	18.5	41.9	63.4	37.6	22.7	35.6	26.4
752	Corn gluten meal.	53.3	17.4	38.1	12.4	135.3	15.1	11.6	18.7	101.1	9.8	16.8	36.1	54.6	33.4	19.6	30.7	22.6
753	Corn gluten meal.	52.1	19.5	40.1	13.1	121.7	16.3	10.5	19.7	73.2	10.1	18.2	39.7	60.1	34.2	21.9	33.4	24.2
807	Corn gluten meal.	66.2	23.2	45.6	12.9	152.2	17.8	13.9	25.1	115.1	11.5	16.9	46.1	69.2	40.0	24.2	38.2	30.0
808	Corn gluten meal.	69.3	24.5	47.0	12.9	162.4	18.5	14.7	27.3	123.7	12.3	17.7	48.6	70.0	40.2	24.8	40.8	32.3

TABLE 2 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	GLY	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
829	Corn gluten meal.	67.4	24.7	45.8	13.4	158.1	19.1	14.9	25.3	122.0	11.9	15.5	46.4	70.7	39.0	24.5	39.4	31.4
830	Corn gluten meal.	67.3	26.8	47.4	14.4	150.8	21.7	15.2	25.9	115.9	13.3	21.0	46.8	72.0	40.6	24.5	40.1	31.0
831	Corn gluten meal.	65.0	26.1	46.0	13.4	154.7	20.2	14.9	25.8	114.8	12.9	20.5	45.9	68.6	39.1	23.7	39.2	30.7
663	Feather meal.	40.4	65.5	64.1	46.0	102.0	71.0	8.6	38.5	71.5	27.5	6.8	40.7	113.1	96.3	41.8	25.8	54.8
664	Feather meal.	44.0	69.0	65.8	44.1	104.0	74.5	7.4	42.3	77.0	23.6	5.7	46.1	137.6	111.1	43.6	28.1	65.1
665	Feather meal.	42.7	62.6	61.0	44.2	93.6	66.2	7.2	40.0	72.5	22.2	5.7	43.7	121.6	103.5	41.5	24.8	59.2
714	Feather meal.	39.9	62.3	64.1	45.6	110.3	63.3	11.0	34.8	72.1	29.1	7.3	39.9	80.1	97.5	41.3	26.1	53.2
715	Feather meal.	40.2	62.6	60.5	52.9	104.2	69.6	6.5	38.7	70.9	20.2	5.4	42.0	94.6	112.0	42.7	24.9	57.1
716	Feather meal.	40.1	61.6	60.1	45.2	100.4	66.8	7.8	38.9	72.0	23.4	5.9	41.7	91.8	103.8	41.0	24.1	58.4
737	Feather meal.	40.8	59.4	62.6	44.4	105.7	60.0	13.0	32.3	71.5	30.3	7.3	39.4	74.4	89.3	39.5	24.8	53.9
738	Feather meal.	39.8	62.3	59.5	61.8	102.1	67.3	7.1	37.6	70.2	20.6	6.0	41.6	90.2	104.6	40.9	25.0	57.7
790	Feather meal.	40.9	73.3	66.1	47.4	116.7	65.5	11.2	38.6	77.6	30.1	7.3	43.5	89.2	104.5	44.3	27.7	60.0
791	Feather meal.	40.3	72.9	64.1	52.9	110.4	66.7	7.6	40.2	76.2	24.1	6.6	44.8	96.9	110.8	44.8	27.0	61.0
815	Feather meal.	41.9	73.5	65.2	44.2	118.2	66.8	10.6	38.4	75.9	30.5	7.7	41.8	84.7	100.0	43.4	27.7	58.1
816	Feather meal.	41.1	72.4	63.3	52.9	110.8	70.6	7.7	41.2	74.4	24.8	5.9	43.5	93.5	109.0	43.0	26.9	60.2
662	Fish meal.	43.5	42.5	60.8	6.0	81.9	65.9	12.3	20.0	41.9	41.5	17.8	22.4	35.7	32.5	24.2	17.3	26.0
712	Fish meal.	41.2	43.3	65.3	6.2	88.7	54.0	14.1	22.4	45.1	47.8	20.0	23.7	30.3	32.4	27.7	21.3	26.0
713	Fish meal.	43.9	45.7	67.2	6.6	91.3	61.7	14.0	22.6	46.6	49.3	20.8	23.4	34.8	35.4	28.6	21.0	27.1
734	Fish meal.	41.7	48.5	68.3	8.1	92.4	40.1	16.5	26.2	53.5	55.2	23.0	26.7	27.7	30.4	30.4	23.0	33.2
735	Fish meal.	43.4	43.4	68.5	7.2	90.0	49.9	16.3	24.9	50.1	51.4	21.1	26.0	31.4	31.2	29.2	22.0	29.7
736	Fish meal.	40.7	42.4	62.2	9.4	87.4	53.8	13.2	23.6	47.1	45.5	20.2	23.8	33.1	35.0	26.5	20.7	28.0
788	Fish meal.	43.4	50.5	68.1	7.4	94.6	57.9	14.5	23.2	48.8	52.2	20.7	24.6	33.2	35.3	29.8	22.4	28.1
789	Fish meal.	42.9	46.7	65.8	6.9	89.1	51.2	16.4	24.9	49.7	52.7	21.3	25.9	31.4	31.5	29.1	22.6	30.2
814	Fish meal.	42.5	43.6	65.2	7.1	84.4	48.2	17.0	25.0	48.7	51.8	20.3	26.0	30.0	27.8	29.2	21.8	30.8
620	Fish meal.	40.4	41.8	65.0	5.7	90.0	45.1	16.1	26.9	49.0	52.5	18.3	25.8	30.0	26.3	28.1	21.4	31.8
621	Fish meal.	42.0	42.4	62.4	5.9	89.4	48.1	15.8	25.4	47.6	51.5	19.0	25.1	31.2	26.3	27.7	20.9	29.8
622	Fish meal.	40.8	42.2	62.7	5.6	88.3	47.1	15.7	25.2	47.3	51.8	18.6	24.8	30.3	26.4	27.0	20.4	30.1
623	Fish meal.	41.2	42.5	62.8	5.9	89.2	47.1	15.7	25.8	47.7	52.6	19.3	24.9	30.6	26.4	27.4	20.6	30.7
624	Fish meal.	40.5	42.8	63.8	5.9	88.8	45.0	15.8	27.0	49.2	52.6	19.2	26.5	30.7	27.4	28.7	22.2	31.2
625	Fish meal.	40.6	42.9	63.8	6.0	89.1	46.2	15.3	25.6	48.1	51.3	18.1	25.4	31.2	27.3	28.8	21.4	30.7
626	Fish meal.	44.1	42.1	62.7	5.1	88.2	51.9	16.0	25.0	46.7	50.5	16.6	24.7	32.4	27.1	27.8	19.3	30.2
627	Fish meal.	43.4	41.0	62.6	5.4	86.9	50.7	15.5	23.9	46.0	49.3	17.0	24.3	32.1	26.8	27.1	19.0	29.2
628	Fish meal.	43.0	41.1	62.3	5.3	86.4	50.3	15.7	23.9	45.9	49.2	17.0	24.2	31.8	26.6	27.3	18.9	29.0
629	Fish meal.	43.5	44.8	67.7	5.9	92.9	48.1	16.0	27.7	51.2	54.1	18.8	27.5	32.5	28.4	30.6	22.3	33.0
630	Fish meal.	42.4	43.5	65.2	5.6	92.0	47.1	15.9	27.2	50.1	52.9	18.4	26.6	31.7	28.0	29.2	22.1	32.5
631	Fish meal.	44.1	44.7	68.9	6.1	93.6	49.1	16.6	27.8	51.9	54.9	19.2	27.7	33.0	28.8	30.4	23.0	33.3
632	Fish meal.	40.4	39.7	57.9	5.1	79.4	47.4	19.1	22.5	44.5	46.7	15.7	23.0	30.4	26.5	24.9	18.6	28.2
633	Fish meal.	43.0	42.1	62.1	5.5	84.2	50.5	20.1	24.2	46.7	49.6	16.2	24.3	32.6	27.3	27.4	19.5	29.6
634	Fish meal.	43.7	42.8	62.8	5.6	84.9	51.5	20.4	24.8	47.5	50.3	16.5	24.9	33.0	27.6	27.4	19.8	30.7

TABLE 2 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	GLY	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
658	Meat meal.	46.0	42.7	55.3	5.4	71.2	80.3	11.5	15.8	37.4	32.1	8.1	20.6	51.6	24.7	19.7	13.7	26.3
659	Meat meal.	40.5	35.6	44.3	4.0	56.9	75.5	9.0	11.0	29.3	25.2	5.9	16.6	46.2	20.5	15.1	10.0	19.9
660	Meat meal.	37.6	34.3	43.7	4.6	56.4	69.5	9.1	11.2	28.1	25.5	6.6	15.8	42.4	19.3	14.8	10.0	18.0
661	Meat meal.	42.3	39.0	48.4	4.5	65.3	81.5	10.0	14.0	31.5	27.8	6.8	17.5	48.8	21.9	17.1	11.3	22.2
709	Meat meal.	35.9	33.2	43.2	4.9	57.9	64.4	9.0	12.0	28.5	24.3	7.6	14.9	38.5	21.3	15.6	10.8	18.1
710	Meat meal.	42.3	36.7	49.7	4.8	63.2	72.8	12.3	12.0	34.7	29.0	7.6	18.0	43.3	22.6	17.6	11.6	21.1
711	Meat meal.	37.5	34.3	44.8	4.6	57.9	68.6	10.0	11.7	28.9	26.9	7.2	15.5	40.5	19.8	15.8	10.1	17.5
731	Meat meal.	38.6	37.4	47.7	6.1	63.5	72.3	9.8	13.3	31.3	27.8	7.8	16.7	44.3	23.1	17.1	11.5	20.3
732	Meat meal.	37.1	33.8	44.3	5.7	57.7	67.5	9.1	11.6	28.7	25.6	7.3	15.1	40.1	20.4	15.6	10.3	18.1
733	Meat meal.	38.5	35.9	46.3	6.1	59.7	69.6	10.2	12.7	30.1	27.7	7.6	16.2	42.4	20.9	16.4	10.7	18.6
785	Meat meal.	38.2	36.6	45.7	5.7	61.6	71.2	9.6	13.3	31.8	26.5	7.5	17.0	42.9	22.6	17.5	11.7	20.7
786	Meat meal.	43.6	39.5	51.7	5.9	67.0	77.2	12.2	13.8	37.7	30.5	7.8	19.8	46.2	24.4	19.2	13.1	24.4
787	Meat meal.	38.1	35.2	43.7	5.1	57.6	72.7	9.3	11.9	28.7	25.6	7.2	15.6	42.8	19.7	15.5	10.2	18.5
812	Meat meal.	8.5	13.4	14.6	4.5	35.0	9.8	5.5	4.9	10.8	9.0	3.4	6.5	10.5	7.5	6.1	5.0	6.7
813	Meat meal.	40.7	41.1	48.7	5.6	63.8	74.5	11.0	13.6	32.5	29.6	7.6	17.4	45.3	21.5	17.4	11.5	21.5
699	Oats.	5.2	7.3	10.2	3.3	21.3	5.5	2.5	3.9	8.3	5.0	2.0	5.4	5.8	4.9	3.6	3.6	5.2
700	Oats.	5.3	6.8	9.8	6.4	20.1	5.4	2.3	4.0	8.1	4.8	1.8	5.4	5.6	4.7	3.7	3.4	5.3
701	Oats.	4.9	7.9	9.8	5.4	20.0	5.2	2.4	3.8	7.9	4.8	1.4	5.1	5.7	4.6	3.5	3.4	5.0
702	Oats.	5.4	7.4	10.3	9.5	22.7	5.6	2.6	4.1	8.8	5.2	2.1	5.8	6.1	5.2	3.7	3.8	5.7
703	Oats.	6.6	10.5	12.9	11.0	26.8	6.8	3.1	5.0	10.4	6.2	2.2	6.8	7.3	6.3	4.6	4.6	6.5
764	Oats.	5.8	8.4	10.8	3.7	24.7	6.1	2.9	4.2	9.0	5.3	1.9	5.9	6.3	6.1	4.4	4.0	5.5
774	Oats.	5.5	7.6	9.9	4.0	23.6	5.8	2.7	3.8	8.8	5.1	2.1	5.7	6.1	5.8	4.0	3.7	5.2
770	Oats.	4.7	6.0	8.5	2.7	18.7	5.0	2.3	3.1	7.1	4.5	1.2	4.5	4.9	5.0	3.3	3.1	4.2
760	Oats.	4.9	6.5	9.0	3.7	19.1	5.3	2.3	3.0	7.2	4.6	2.0	4.6	5.2	5.2	3.6	3.4	4.0
759	Oats.	5.5	7.4	10.0	3.7	22.4	5.6	2.6	3.5	8.3	5.0	1.8	5.3	6.0	5.7	3.9	3.6	4.7
771	Oats.	5.6	7.7	9.7	4.0	28.2	5.9	2.9	4.1	9.2	5.0	2.1	6.1	8.3	6.0	4.1	3.9	5.5
796	Rapeseed meal.	18.7	26.5	32.4	9.8	68.6	20.8	11.0	14.4	29.2	22.1	8.5	16.1	24.4	18.7	18.3	11.7	18.6
797	Rapeseed meal.	17.9	25.8	31.0	9.5	66.0	20.0	10.6	13.6	27.8	21.5	8.2	15.5	23.5	17.9	17.6	11.3	18.0
798	Rapeseed meal.	17.3	23.9	29.3	9.3	64.0	19.5	10.3	13.2	27.4	20.9	8.0	15.0	22.4	17.1	17.4	11.0	17.5
818	Rapeseed meal.	18.7	27.2	33.1	10.7	70.6	21.0	11.3	14.5	29.1	23.8	8.6	16.2	24.5	18.7	18.6	11.9	18.6
819	Rapeseed meal.	17.5	25.0	30.3	9.5	65.7	19.7	10.5	13.5	27.3	21.4	8.3	15.2	22.6	17.4	17.4	11.1	17.0
820	Rapeseed meal.	19.3	28.9	33.0	10.9	76.5	21.5	11.9	15.2	30.7	24.8	9.1	16.9	26.1	19.4	18.5	12.3	19.4
821	Rapeseed meal.	16.9	25.2	30.3	18.0	65.5	19.8	11.2	14.1	27.5	23.1	14.9	14.9	22.2	17.4	17.3	10.8	17.7
822	Rapeseed meal.	17.0	24.4	29.7	9.4	63.1	19.2	10.4	13.5	26.5	21.9	8.1	14.7	22.4	17.2	17.1	10.9	17.9
668	Rapeseed meal.	19.7	27.2	33.1	9.9	74.7	21.8	11.6	15.6	31.0	25.1	7.9	17.0	26.7	19.8	19.2	12.2	20.2
669	Rapeseed meal.	16.4	22.5	28.4	9.5	60.3	19.1	9.7	12.6	25.4	21.0	8.2	14.2	21.2	16.2	15 9	10.2	16.6
670	Rapeseed meal.	18.9	26.2	32.4	9.9	70.4	20.8	11.1	15.0	29.5	23.9	8.0	16.4	24.4	18.5	18.8	11.7	19.0
720	Rapeseed meal.	17.0	24.2	31.7	10.4	68.5	19.7	11.1	13.3	27.6	21.9	8.5	14.9	22.2	18.1	16.9	10.7	16.6

TABLE 2 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	GLY	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
721	Rapeseed meal.	16.1	22.2	29.4	9.6	64.0	18.7	10.3	12.3	25.5	21.6	7.2	13.6	21.3	17.1	16.2	10.4	15.2
722	Rapeseed meal.	16.5	23.8	30.6	9.7	65.4	19.0	10.4	12.6	26.6	21.1	7.2	14.4	21.2	17.4	16.4	10.2	15.4
743	Rapeseed meal.	16.2	23.6	30.9	10.0	65.2	19.4	10.6	13.2	26.2	22.1	7.8	14.1	21.8	17.5	16.8	10.7	16.9
744	Rapeseed meal.	17.1	25.2	31.2	11.5	72.3	19.9	11.3	13.9	27.7	22.6	10.4	15.0	23.0	17.8	16.9	10.7	17.1
745	Rapeseed meal.	15.3	20.8	28.0	9.4	59.4	18.1	10.1	12.5	24.5	20.5	8.3	13.2	20.3	16.0	15.6	10.0	15.5
746	Rapeseed meal.	16.9	25.2	31.5	10.8	71.9	19.9	11.1	13.7	27.7	22.4	8.8	15.0	23.1	17.9	16.7	10.8	17.2
747	Rapeseed meal.	17.6	25.8	32.4	11.4	75.1	20.4	11.6	14.4	28.6	23.3	9.0	15.8	23.4	18.3	17.3	11.1	17.8
641	Rice bran.	8.0	10.4	11.7	3.2	17.8	7.0	3.5	4.5	9.3	6.1	2.5	5.8	5.7	6.3	4.8	4.7	6.9
642	Rice bran.	9.5	13.0	13.2	3.3	18.7	8.2	4.1	4.9	9.9	7.1	3.5	6.8	6.8	7.2	5.6	4.8	8.0
647	Rice bran.	9.1	13.6	14.8	3.8	21.3	8.1	4.5	4.6	10.6	6.2	3.1	6.6	6.4	7.0	5.4	5.3	7.3
648	Rice bran.	9.7	9.5	14.7	3.7	20.5	8.4	4.1	4.9	11.2	7.1	3.5	6.9	7.0	7.8	6.1	5.3	7.6
644	Rice bran.	10.9	15.3	14.8	3.5	20.6	9.5	4.8	5.5	11.1	8.2	3.5	7.5	7.6	8.1	6.4	5.0	9.2
704	Screenings.	8.6	14.6	15.9	8.1	29.0	9.7	4.6	6.9	13.2	10.4	3.7	7.7	10.1	8.4	7.5	5.5	8.7
705	Screenings.	8.1	11.9	14.2	2.6	27.0	8.2	3.4	5.8	11.5	6.3	2.9	6.9	7.8	7.4	5.9	4.2	7.3
706	Screenings.	5.3	8.1	8.6	3.0	39.1	6.0	3.5	4.9	9.8	4.5	2.3	6.8	13.2	6.7	4.3	4.0	5.9
707	Screenings.	6.6	5.7	8.4	1.8	18.6	5.0	2.4	3.9	9.1	4.3	2.0	4.7	6.9	5.0	4.1	3.0	5.1
708	Screenings.	6.2	9.2	11.2	3.8	27.0	6.5	3.1	4.4	10.0	5.5	2.3	6.8	7.2	6.7	4.6	4.7	5.9
639	Sesame seed meal.	19.5	52.1	38.3	9.5	81.4	21.7	11.1	14.1	28.5	11.3	12.7	18.3	13.9	22.6	15.3	15.0	17.7
645	Sesame seed meal.	21.1	52.7	36.6	10.5	79.2	21.2	10.5	14.7	28.4	10.6	13.7	19.7	15.5	20.7	16.0	15.5	19.2
678	Shrimp meal.	23.5	25.0	39.6	4.8	52.4	20.1	10.0	15.5	24.2	23.2	8.9	133.6	18.1	22.8	18.2	25.0	19.9
840	Single cell protein.	50.8	33.1	71.4	5.3	72.4	39.6	13.6	30.9	52.3	44.4	16.9	25.4	22.2	24.9	33.9	22.4	38.0
671	Soybean meal.	22.2	39.4	61.8	7.8	93.8	21.6	13.6	20.4	39.2	32.0	7.6	25.7	26.0	27.2	20.2	17.9	21.4
672	Soybean meal.	22.4	39.0	61.8	7.8	94.2	21.8	13.6	20.0	39.3	32.1	7.8	25.6	26.1	27.5	20.2	17.9	21.0
673	Soybean meal.	26.8	46.8	73.8	8.7	111.7	26.1	16.5	25.8	48.2	38.6	8.7	31.1	31.2	33.2	24.7	21.8	28.7
723	Soybean meal.	22.8	39.9	63.2	8.0	98.0	22.7	14.7	20.2	40.7	34.1	7.7	25.8	26.3	28.8	21.1	17.7	20.6
724	Soybean meal.	22.2	39.0	61.6	8.5	96.0	21.7	14.3	21.1	39.9	33.4	8.2	25.3	25.3	28.2	20.5	17.3	20.6
748	Soybean meal.	22.0	38.7	63.3	8.9	98.1	22.0	14.2	18.2	39.1	33.0	8.4	24.6	26.4	28.6	20.5	17.2	17.7
749	Soybean meal.	20.4	35.0	59.3	9.0	91.0	20.4	13.1	16.6	36.4	31.0	8.1	22.8	24.0	26.6	19.3	15.8	17.1
750	Soybean meal.	22.3	38.7	63.8	9.5	99.1	22.2	14.2	18.3	39.1	33.1	8.4	24.8	26.5	28.9	20.5	17.6	18.8
751	Soybean meal.	21.4	36.6	61.8	9.0	96.8	21.5	13.7	18.1	38.2	32.3	7.7	24.3	25.1	28.1	20.1	17.0	18.7
799	Soybean meal.	24.9	42.7	66.1	8.9	103.9	23.8	14.9	22.6	44.2	35.7	8.4	28.1	29.1	30.0	22.4	19.5	23.8
800	Soybean meal.	25.4	44.7	68.2	9.4	110.2	24.7	15.5	23.1	45.6	37.2	8.4	29.4	30.5	31.9	23.1	20.7	23.8
801	Soybean meal.	24.5	42.1	64.2	9.4	102.6	23.7	14.7	22.1	43.2	35.4	8.6	27.7	28.5	29.8	22.1	19.9	23.1
802	Soybean meal.	24.4	44.8	67.9	9.2	104.0	23.9	15.1	23.0	43.8	35.8	8.7	28.0	28.8	30.6	22.1	20.0	23.5

TABLE 2 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	GLY	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
803	Soybean meal.	23.8	44.6	66.7	9.5	102.7	23.1	14.7	22.3	42.5	35.4	8.5	27.5	28.5	30.0	22.3	19.4	23.2
804	Soybean meal.	24.5	46.1	68.6	9.6	105.3	23.6	15.3	22.5	43.4	36.1	8.7	27.9	29.0	31.0	22.7	20.1	23.2
823	Soybean meal.	24.4	46.0	65.9	8.8	102.7	23.5	15.1	23.3	43.7	35.7	8.0	28.1	28.7	29.6	21.9	19.7	24.0
824	Soybean meal.	22.7	42.9	63.0	9.6	97.6	21.9	14.3	22.4	40.8	33.9	8.9	26.5	26.9	28.0	20.6	17.8	23.1
825	Soybean meal.	25.9	49.2	70.6	9.6	110.4	24.8	16.1	24.9	46.5	38.3	8.5	30.0	30.7	32.0	23.1	20.3	26.1
826	Soybean meal.	24.7	46.8	68.5	9.3	104.9	23.7	15.2	23.6	44.2	36.4	8.2	28.4	29.3	30.5	22.3	19.9	24.2
679	Wheat.	6.5	8.6	11.3	4.5	62.0	7.9	4.8	6.0	13.1	5.6	3.0	9.3	20.1	8.9	5.5	4.9	6.5
680	Wheat.	5.9	8.6	9.6	3.8	53.0	7.0	4.3	5.3	11.1	5.7	2.3	7.9	17.0	7.9	4.8	4.7	6.4
681	Wheat.	6.2	8.7	10.4	4.6	58.9	7.5	4.6	5.7	12.3	5.3	3.4	9.0	17.8	8.6	5.3	4.8	6.6
682	Wheat.	5.7	7.7	9.4	4.3	52.0	6.8	4.1	5.1	11.1	4.9	2.9	7.5	6.2	7.6	4.7	4.3	5.7
683	Wheat.	5.2	6.6	8.5	3.9	43.5	6.0	3.7	4.3	9.8	4.4	2.7	6.4	13.8	6.7	4.3	3.7	4.9
684	Wheat.	5.7	8.1	9.2	3.7	52.5	6.8	4.2	4.7	10.7	5.5	2.5	7.8	17.2	7.7	4.6	4.7	5.5
685	Wheat.	6.8	9.3	11.4	4.6	62.2	8.1	4.9	6.4	13.3	5.7	2.5	9.4	19.9	8.9	5.4	5.2	7.2
686	Wheat.	5.4	7.6	8.6	3.8	49.2	6.5	4.0	4.7	10.5	5.3	2.2	7.2	16.1	7.6	4.5	4.1	5.7
687	Wheat.	6.1	8.3	10.8	4.3	58.6	7.3	4.6	5.8	12.3	5.2	1.2	8.8	18.8	8.2	5.0	4.9	6.3
688	Wheat.	6.0	8.9	10.5	4.7	55.9	7.1	4.4	5.6	11.8	5.0	3.0	8.1	18.4	8.2	5.0	4.6	6.0
773	Wheat.	6.3	8.7	9.7	5.0	58.8	7.3	4.5	5.7	12.5	5.1	2.3	9.1	20.3	8.7	5.2	4.9	7.0
778	Wheat.	6.2	8.5	9.6	4.5	59.1	7.3	4.5	5.7	12.6	5.1	2.7	9.2	20.3	8.7	5.1	5.1	6.8
784	Wheat.	6.4	8.6	9.2	4.2	113.8	7.2	4.2	5.5	12.0	5.0	2.8	8.7	19.1	8.0	5.0	5.2	7.0
779	Wheat.	5.7	8.0	8.9	4.3	52.8	6.8	4.1	5.1	11.4	4.8	2.5	8.2	18.0	8.1	4.7	4.7	6.2
782	Wheat.	6.3	8.3	9.2	4.1	58.5	7.1	4.1	5.5	12.0	4.8	2.5	8.7	19.0	8.0	5.0	5.0	6.9
783	Wheat.	6.5	8.6	9.5	4.3	117.4	7.3	4.3	5.5	12.1	5.0	2.9	8.8	19.4	8.1	5.1	5.0	6.9
772	Wheat.	5.3	7.4	8.2	4.2	46.0	6.3	3.8	4.7	10.4	4.5	2.6	7.2	15.9	7.0	4.5	4.4	5.9
781	Wheat.	5.6	7.7	8.4	4.2	49.5	6.6	3.9	4.8	10.8	4.6	2.6	7.7	17.0	7.8	4.8	4.6	5.9
776	Wheat.	7.2	10.3	11.1	5.1	66.2	8.6	5.2	6.5	14.6	5.9	3.8	10.9	24.1	10.3	6.0	6.4	8.1
780	Wheat.	6.1	8.7	9.8	4.5	56.8	7.2	4.4	5.4	12.2	5.0	2.7	8.8	19.4	8.6	5.1	5.2	6.5
676	Wheat shorts.	9.1	13.8	14.2	4.3	37.9	10.2	5.3	5.5	11.9	8.6	2.7	7.4	12.3	7.7	6.2	5.4	8.1
677	Wheat shorts.	10.9	16.4	17.0	4.4	41.0	12.0	6.2	6.3	13.6	10.3	3.1	8.4	13.4	9.0	7.2	6.1	9.8
728	Wheat shorts.	8.3	12.6	12.7	4.2	34.3	9.1	4.8	5.2	11.0	7.5	2.9	7.0	11.3	8.1	5.8	5.1	7.6
729	Wheat shorts.	9.3	14.0	42.8	4.4	35.9	10.2	5.3	5.4	11.8	8.3	2.8	7.4	11.8	8.7	6.6	5.5	8.1
730	Wheat shorts.	8.3	12.7	13.0	4.3	34.5	9.3	4.9	5.1	11.0	7.4	2.8	6.9	11.4	8.1	6.0	5.1	7.4
756	Wheat shorts.	8.4	12.4	13.2	4.5	36.6	9.1	4.9	4.8	11.2	7.5	2.7	7.0	12.3	8.4	6.0	5.2	7.2
757	Wheat shorts.	8.8	12.8	13.6	4.7	38.4	9.5	5.0	5.1	11.6	7.9	2.8	7.2	12.9	8.6	6.2	5.5	7.4
758	Wheat shorts.	8.0	11.8	37.4	4.7	33.2	9.0	4.7	4.3	10.3	7.0	3.0	6.5	11.0	7.9	5.7	4.9	6.5
809	Wheat shorts.	9.5	14.7	13.8	4.9	36.5	10.1	5.4	5.7	12.5	8.3	3.4	7.8	12.4	7.7	6.0	5.7	8.4
810	Wheat shorts.	9.7	14.7	15.5	4.5	40.0	10.1	5.5	6.3	13.5	8.4	3.0	8.2	13.4	8.9	6.5	5.9	8.8
811	Wheat shorts.	9.3	15.0	14.2	4.5	36.4	10.1	5.3	5.9	12.1	8.4	3.4	7.6	12.5	8.2	6.3	5.4	8.8
832	Wheat shorts.	9.7	15.4	14.5	4.5	39.3	10.4	5.5	6.0	12.5	8.4	3.3	8.0	13.2	8.9	6.5	5.8	8.5

TABLE 2 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	GLY	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
833	Wheat shorts.	10.0	15.8	14.6	4.6	41.6	10.8	5.6	6.0	12.9	8.7	3.2	8.2	13.9	9.6	6.7	6.0	8.8
834	Wheat shorts.	9.9	16.1	14.9	4.6	39.8	10.8	5.6	5.9	12.8	8.7	3.4	8.2	13.4	9.2	6.6	5.9	8.8
835	Wheat shorts.	10.0	16.2	14.7	4.5	40.7	10.8	5.6	6.0	13.0	8.8	3.2	8.2	13.2	9.2	6.8	5.9	8.8
638	Yucca.	5.5	12.7	1.6	0.6	14.1	6.1	4.5	ND	7.7	9.5	ND	ND	ND	7.2	5.3	ND	ND
640	Yucca.	0.8	1.3	0.9	ND	2.4	0.5	0.4	ND	ND	ND	ND	ND	ND	0.5	0.4	ND	ND

[1] Blanks (-) = variable not measured; ND = variable not detected in a reportable amount.

TABLE 3

True available amino acids in the dry matter of several feedingstuffs (g/kg)[1]

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
655	Alfalfa.	4.9	4.9	16.8	0.7	9.3	2.0	3.8	7.5	4.7	1.9	5.1	11.0	4.8	4.3	2.8	5.2
656	Alfalfa.	7.7	8.3	21.5	-	14.7	2.8	5.9	11.7	5.1	-	7.5	11.5	6.8	6.5	4.6	7.4
653	Alfalfa.	6.1	5.8	20.6	1.0	12.1	2.4	4.7	8.9	6.1	1.7	6.0	10.5	5.9	5.3	3.4	6.2
839	Alfalfa.	7.8	5.2	15.3	2.4	8.9	2.6	3.9	7.9	5.1	1.4	5.1	5.4	4.6	4.3	3.1	4.7
657	Alfalfa.	6.3	6.3	19.1	0.6	11.3	3.2	4.8	9.3	4.4	1.8	6.1	9.7	5.9	5.6	3.4	6.2
652	Alfalfa.	7.0	7.0	19.7	0.9	13.1	3.3	5.1	10.1	5.2	2.1	6.3	10.2	6.4	6.1	4.0	6.7
654	Alfalfa.	6.4	6.2	18.9	2.3	11.1	3.0	4.4	9.2	4.1	1.8	5.9	7.2	5.5	5.3	3.5	5.8
649	Algae.	27.1	19.7	30.4	10.1	29.8	4.7	11.0	25.8	16.8	6.9	15.4	15.4	12.5	15.9	10.6	17.1
650	Algae.	27.2	20.9	34.0	9.5	34.3	5.1	12.9	29.1	16.6	7.4	17.2	16.7	13.7	16.6	11.6	19.2
689	Barley.	3.9	6.1	6.7	2.5	31.8	3.0	3.5	7.9	4.4	1.9	5.8	13.0	4.9	3.7	3.5	4.7
690	Barley.	3.9	5.4	7.0	3.9	28.8	2.7	3.3	7.9	3.7	1.6	5.6	12.3	4.7	3.3	3.2	3.9
691	Barley.	2.5	4.1	5.5	2.1	17.9	1.8	2.1	5.2	2.6	1.5	3.3	7.1	3.2	2.1	1.9	2.2
692	Barley.	3.7	5.6	6.9	2.8	28.1	2.6	3.2	7.5	3.5	1.8	5.4	12.1	4.4	3.2	3.0	3.8
693	Barley.	3.4	4.8	6.7	2.3	23.1	2.3	2.7	6.5	3.2	1.2	4.2	9.5	3.9	2.9	2.6	3.3
694	Barley.	3.7	5.4	7.6	2.8	25.0	2.5	3.0	7.1	3.8	1.3	4.9	10.6	4.6	3.1	3.0	3.6
695	Barley.	3.9	6.4	7.8	3.3	31.1	2.8	3.7	8.1	3.9	2.2	6.0	13.4	5.0	3.6	3.5	3.9
696	Barley.	3.7	5.7	7.4	3.1	27.8	2.6	3.1	7.4	3.8	0.7	5.3	11.1	6.1	3.4	3.1	3.9
697	Barley.	3.8	6.0	7.7	2.8	27.6	2.7	3.3	7.8	4.0	3.2	5.4	11.7	4.7	3.5	3.1	4.1
698	Barley.	4.6	7.9	8.7	2.5	35.0	3.2	4.3	9.3	4.7	2.0	7.5	16.2	5.2	4.1	3.9	5.9
769	Barley.	3.8	6.0	6.3	2.6	31.3	2.9	3.4	8.3	4.0	1.6	6.5	14.6	5.0	3.6	3.6	4.8
765	Barley.	3.9	5.6	6.1	2.2	25.9	2.6	3.4	7.5	4.1	1.6	5.4	10.8	4.1	3.2	3.3	4.7
762	Barley.	4.4	6.0	6.9	2.5	31.4	2.8	3.8	8.5	4.4	1.9	6.3	14.2	5.2	3.9	3.8	5.2
775	Barley.	3.2	4.5	5.2	2.2	20.6	2.1	2.5	6.1	3.4	1.4	4.3	9.2	3.5	2.7	2.5	3.6
777	Barley.	4.3	6.3	6.5	3.2	38.2	2.8	4.1	9.5	3.8	2.2	7.6	18.3	5.7	3.6	4.2	5.7
767	Barley.	2.8	4.2	4.8	1.9	19.0	2.1	2.4	5.5	3.2	1.3	3.9	8.0	2.9	2.4	2.4	3.3
768	Barley.	3.3	4.8	5.3	2.4	23.5	2.3	2.8	6.6	3.4	1.4	4.7	10.6	4.0	2.8	2.6	4.0
761	Barley.	3.6	5.1	6.3	2.9	25.8	2.5	2.6	6.9	3.6	1.5	5.1	11.6	4.7	3.3	3.0	3.8
763	Barley.	3.7	5.1	5.9	2.1	24.6	2.4	3.1	6.9	3.7	1.5	5.0	10.9	4.3	3.1	3.0	4.3
766	Barley.	5.1	7.2	7.8	2.7	39.0	3.4	4.6	10.2	5.2	1.9	8.3	18.2	5.8	4.2	4.4	6.2
666	Blood meal.	67.7	46.5	101.0	15.5	87.0	48.4	15.5	110.6	69.0	7.9	59.4	44.2	52.0	37.9	28.5	67.2
667	Blood meal.	89.7	45.5	121.6	9.7	91.0	67.2	7.3	136.1	93.1	12.6	77.9	40.0	55.4	48.0	31.6	89.2
717	Blood meal.	64.9	31.5	81.5	6.9	66.3	44.8	4.4	96.3	68.4	11.6	57.2	28.3	43.3	38.0	24.4	53.9
718	Blood meal.	62.8	41.1	92.9	13.2	81.7	47.5	12.4	102.8	66.8	8.6	54.9	34.5	47.8	34.4	25.7	61.7
719	Blood meal.	68.0	39.0	93.7	11.5	80.1	51.6	10.1	103.8	75.3	11.9	58.1	32.9	45.8	40.0	27.4	59.7
739	Blood meal.	66.5	32.3	84.8	9.3	68.4	46.3	4.6	100.5	67.0	12.6	58.9	30.9	44.6	39.5	25.4	57.1

TABLE 3 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
740	Blood meal.	64.6	40.2	90.4	12.9	79.8	48.9	12.1	101.9	69.6	8.6	54.5	34.4	45.2	33.5	25.8	61.4
741	Blood meal.	64.9	35.6	86.7	9.9	74.5	47.7	8.5	100.7	66.6	10.7	56.0	31.6	43.5	37.3	26.7	59.1
742	Blood meal.	71.8	35.2	95.9	9.2	74.8	54.4	6.4	110.7	70.8	10.8	62.0	33.0	44.1	37.4	25.5	65.2
792	Blood meal.	75.9	41.5	107.5	8.6	83.4	60.5	6.5	123.8	85.3	11.1	69.3	36.0	49.2	41.4	28.6	72.0
793	Blood meal.	66.8	47.9	99.0	13.5	87.0	52.7	13.3	111.4	73.5	8.8	60.1	38.1	51.0	36.8	28.1	65.7
794	Blood meal.	66.5	42.0	99.2	9.3	82.0	52.4	7.6	107.9	72.4	7.7	57.3	32.3	41.4	31.5	24.0	61.3
795	Blood meal.	68.2	38.4	91.6	8.8	76.7	51.7	5.3	109.1	77.7	12.6	64.9	31.9	48.4	42.6	27.7	61.2
817	Blood meal.	71.8	46.9	101.5	12.2	87.7	56.2	12.2	115.8	76.0	8.4	61.1	37.3	50.2	36.5	28.9	70.9
643	Coconut meal.	7.1	24.8	14.1	2.4	31.6	2.9	5.6	10.0	5.6	4.3	8.4	5.7	7.0	4.1	3.8	8.6
838	Corn.	7.3	5.0	7.5	2.4	17.7	2.8	3.0	12.0	3.3	2.3	4.6	9.0	4.6	3.4	4.0	4.3
853	Corn.	7.0	5.4	7.0	2.3	18.3	3.1	2.7	12.2	3.7	2.1	4.4	9.0	4.4	3.3	3.9	3.8
855	Corn.	7.0	5.6	6.7	2.4	18.5	3.1	2.8	12.6	3.6	2.2	4.5	9.3	4.2	3.2	3.7	4.0
856	Corn.	7.4	5.8	7.4	2.8	19.4	3.3	3.0	13.2	3.8	1.4	4.8	9.9	4.8	3.6	4.3	4.3
857	Corn.	8.6	6.6	7.9	2.8	21.9	3.6	3.5	14.8	4.2	2.4	5.4	11.1	5.3	4.0	4.6	4.8
858	Corn.	7.5	5.7	6.9	2.3	19.3	3.3	3.2	13.2	3.6	2.1	4.8	9.9	4.4	3.2	4.1	4.3
859	Corn.	7.9	5.7	6.5	2.4	19.7	3.2	3.2	13.6	3.1	2.2	4.9	10.0	4.4	3.3	4.1	4.5
860	Corn.	8.0	5.4	7.5	2.8	21.2	3.4	3.5	14.6	3.6	2.4	5.2	10.7	5.2	3.7	4.6	4.8
861	Corn.	7.8	5.6	7.0	2.6	20.1	3.2	3.2	13.7	3.2	2.3	5.1	9.7	5.1	3.5	4.4	4.3
862	Corn.	6.9	5.3	6.4	2.3	18.1	3.0	3.0	12.7	2.9	2.3	4.6	9.1	4.1	3.0	3.9	4.0
646	Corn germ meal.	11.9	14.7	13.4	2.5	28.0	6.2	6.4	15.8	8.4	3.6	8.9	10.6	9.0	6.8	5.8	10.7
651	Corn gluten feed.	20.3	10.0	14.4	4.6	43.6	6.0	7.3	30.9	5.2	4.7	12.2	22.5	11.8	7.8	9.6	10.2
674	Corn gluten feed.	14.1	10.5	13.6	3.6	32.4	6.3	5.6	20.3	6.4	3.0	7.9	16.3	9.0	7.0	6.0	9.1
726	Corn gluten feed.	11.5	10.0	10.8	3.3	27.0	5.4	4.9	17.0	5.0	3.0	6.9	14.3	8.1	5.5	5.1	7.8
727	Corn gluten feed.	12.1	10.6	10.9	3.5	28.6	5.6	5.1	17.7	5.1	3.3	7.4	14.5	8.4	6.1	5.5	8.3
754	Corn gluten feed.	14.6	11.7	13.5	4.3	34.2	6.4	5.5	21.1	5.5	4.0	8.3	18.2	9.8	6.9	7.0	9.2
755	Corn gluten feed.	14.5	11.0	13.3	4.2	33.1	6.2	5.5	20.8	5.8	4.0	8.2	17.9	9.4	6.7	6.5	9.0
805	Corn gluten feed.	15.8	13.0	15.1	3.8	38.1	7.2	6.7	23.7	6.5	4.2	9.0	19.8	10.3	7.6	7.3	10.6
806	Corn gluten feed.	14.0	11.9	13.5	3.4	34.2	6.6	6.0	21.0	6.2	3.9	8.1	17.2	9.2	6.9	6.4	9.3
827	Corn gluten feed.	13.2	11.6	13.2	3.4	31.0	6.1	5.8	19.4	5.6	3.7	7.6	16.4	8.6	6.4	6.3	9.3
828	Corn gluten feed.	13.3	9.8	11.5	3.7	31.6	6.1	4.6	20.0	5.5	3.5	6.9	17.8	8.3	6.2	6.2	7.2
675	Corn gluten meal.	54.1	18.7	37.1	9.1	133.9	11.2	21.3	101.6	9.2	12.9	37.7	57.4	32.5	19.4	30.7	24.0
725	Corn gluten meal.	58.7	20.1	40.4	12.9	148.0	13.0	22.2	112.3	10.0	18.0	40.6	61.5	36.0	20.9	34.4	24.9
752	Corn gluten meal.	51.9	16.1	35.9	11.0	131.9	10.9	17.7	99.1	8.7	16.4	35.2	52.7	31.9	18.2	29.8	21.4
753	Corn gluten meal.	50.9	18.6	38.1	11.7	117.2	9.8	18.9	71.5	9.4	17.8	38.8	58.6	33.0	20.5	32.6	23.1
807	Corn gluten meal.	64.5	21.9	42.4	10.6	148.1	13.0	24.0	112.9	9.8	16.4	44.9	67.1	38.1	22.2	37.1	28.7
808	Corn gluten meal.	67.3	23.0	43.5	10.4	157.9	13.8	26.2	121.3	10.6	17.1	47.3	67.9	38.3	22.8	39.5	30.9

TABLE 3 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
829	Corn gluten meal.	65.5	24.2	42.7	11.4	153.5	14.2	24.0	119.4	10.6	14.9	45.0	68.7	37.1	22.5	38.1	29.8
830	Corn gluten meal.	64.8	26.1	43.7	12.2	145.1	14.3	24.2	112.4	11.5	20.3	45.0	69.4	38.6	22.4	38.5	28.9
831	Corn gluten meal.	63.2	25.6	43.2	11.4	150.7	14.1	24.4	112.1	11.5	19.8	44.5	66.8	37.5	22.0	37.9	29.1
663	Feather meal.	34.5	57.5	43.6	27.0	75.8	6.9	34.5	62.7	19.9	5.7	36.8	94.0	78.9	32.3	21.8	46.7
664	Feather meal.	35.8	57.6	36.0	20.8	66.4	5.0	36.3	64.3	13.9	4.3	40.2	109.3	92.1	30.7	22.1	53.7
665	Feather meal.	34.0	52.8	33.2	22.8	60.6	5.0	34.0	62.2	12.9	4.5	36.8	95.4	79.8	29.1	19.4	47.8
714	Feather meal.	30.1	48.3	34.6	23.0	69.5	7.9	27.7	56.9	17.9	5.4	32.9	50.9	71.9	27.6	19.4	39.6
715	Feather meal.	32.8	51.6	34.3	31.1	72.1	4.6	33.0	58.6	12.6	3.9	35.9	67.4	89.1	30.6	19.6	46.3
716	Feather meal.	31.2	51.0	33.5	23.1	68.6	5.5	32.3	57.7	15.3	4.3	34.4	63.8	81.1	28.8	18.7	45.5
737	Feather meal.	31.7	47.2	36.6	24.8	69.9	9.8	25.8	57.3	20.2	5.4	32.9	48.8	67.4	27.1	19.2	40.8
738	Feather meal.	31.9	51.8	34.7	41.0	71.4	5.0	32.0	57.8	13.1	4.6	35.6	63.7	82.9	29.9	19.8	46.4
790	Feather meal.	30.9	58.6	36.7	23.8	76.1	8.2	31.3	61.8	19.1	5.3	36.3	59.1	79.4	29.9	21.2	45.8
791	Feather meal.	34.2	64.2	44.0	34.4	85.0	5.7	35.5	66.0	17.5	5.2	40.1	75.9	93.1	35.5	22.9	51.8
815	Feather meal.	32.7	59.8	36.1	18.1	77.8	7.8	31.9	61.4	19.1	6.2	35.3	55.3	74.8	29.4	21.5	45.5
816	Feather meal.	34.9	62.7	40.6	32.2	82.2	5.9	36.9	64.5	16.8	4.3	38.8	71.1	90.1	32.8	22.3	51.3
662	Fish meal.	39.1	38.3	48.9	3.6	71.3	10.2	17.8	37.7	35.1	16.5	20.1	31.4	27.8	20.7	15.2	22.9
712	Fish meal.	36.9	39.5	56.5	4.5	80.3	12.5	20.1	41.1	42.2	18.6	21.3	27.0	29.0	24.9	19.5	23.0
713	Fish meal.	40.8	41.8	60.6	5.2	85.0	12.6	20.9	43.8	44.7	19.8	21.7	32.4	32.8	26.4	19.5	25.0
734	Fish meal.	38.6	43.5	62.3	6.2	86.2	14.7	24.3	50.6	48.8	21.9	24.9	25.1	27.8	27.8	21.6	30.8
735	Fish meal.	37.0	37.3	57.2	5.3	76.7	13.5	20.7	43.1	42.8	18.2	22.0	26.4	26.8	25.1	19.0	24.8
736	Fish meal.	36.8	38.9	54.8	7.4	78.9	11.6	21.3	43.2	40.9	18.7	21.5	29.0	31.8	24.1	18.8	25.0
788	Fish meal.	40.8	47.7	61.8	5.9	89.4	13.2	22.0	46.7	49.2	19.9	23.2	31.1	33.0	27.9	21.4	26.5
789	Fish meal.	40.5	43.0	60.0	5.6	84.1	14.8	23.5	47.4	47.1	20.5	24.5	29.5	29.4	27.1	21.5	28.5
814	Fish meal.	38.8	39.3	57.2	4.7	77.1	14.7	23.0	45.3	43.6	19.0	23.9	26.6	24.8	25.8	20.1	28.3
620	Fish meal.	36.9	39.4	57.2	4.3	83.6	14.5	25.4	46.2	47.1	17.2	24.0	27.0	23.8	25.7	20.1	29.9
621	Fish meal.	38.3	39.8	55.3	4.7	82.6	14.1	24.1	45.0	45.0	17.9	23.4	27.9	23.8	25.2	19.7	27.9
622	Fish meal.	37.9	40.2	56.7	4.7	83.4	14.2	24.0	45.1	47.0	17.2	23.4	28.0	24.5	25.0	19.5	28.3
623	Fish meal.	37.7	39.9	56.5	5.0	83.6	14.4	24.6	45.5	48.6	18.0	23.5	27.1	24.2	25.3	19.6	28.9
624	Fish meal.	37.1	40.4	57.3	4.9	82.7	14.3	25.6	46.8	48.0	17.7	25.0	27.4	25.1	26.6	21.1	29.3
625	Fish meal.	37.2	40.2	57.4	4.9	83.2	13.8	24.4	45.8	46.7	16.5	23.9	27.8	24.9	26.7	20.3	29.0
626	Fish meal.	39.9	39.5	53.9	3.8	80.3	14.2	23.5	43.8	43.8	14.9	22.9	29.4	24.2	25.1	18.1	28.2
627	Fish meal.	40.1	38.9	53.4	4.2	80.8	14.0	22.6	43.4	45.0	15.3	22.6	28.9	24.0	24.5	18.0	27.5
628	Fish meal.	40.2	39.4	54.9	4.0	81.2	14.3	22.8	43.6	44.8	15.4	22.8	29.6	24.2	25.2	18.0	27.6
629	Fish meal.	40.2	42.4	61.0	4.7	86.7	14.5	26.1	48.4	49.8	17.2	25.8	29.6	26.0	28.0	21.0	30.8
630	Fish meal.	39.7	41.7	58.7	4.6	86.3	14.2	25.7	47.6	46.9	16.9	25.0	29.4	25.7	27.0	21.0	30.6
631	Fish meal.	40.6	42.0	62.4	4.6	87.4	15.0	26.2	49.0	48.1	17.3	25.8	30.0	26.3	28.1	21.7	31.0
632	Fish meal.	37.6	37.5	51.6	3.8	73.9	17.4	21.0	41.7	41.3	14.0	21.3	28.2	23.9	22.8	17.3	26.3
633	Fish meal.	40.5	40.4	55.9	4.3	79.3	18.6	22.7	44.0	45.4	14.6	22.7	30.4	24.8	25.2	18.4	27.8
634	Fish meal.	41.1	41.0	56.8	4.3	79.9	18.6	23.4	44.9	43.7	14.8	23.3	31.2	25.4	25.4	18.7	28.9

TABLE 3 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
658	Meat meal.	41.0	39.4	45.3	3.3	62.7	10.0	14.3	34.1	27.2	7.4	18.8	45.4	21.3	17.1	12.4	23.9
659	Meat meal.	31.2	28.2	30.8	1.2	43.5	7.4	8.6	23.9	18.4	4.8	13.6	34.7	15.1	11.5	8.0	15.9
660	Meat meal.	31.8	29.8	36.2	2.6	47.6	7.8	9.5	24.4	21.1	5.9	13.6	35.0	15.5	12.4	8.4	15.2
661	Meat meal.	36.7	35.0	39.3	2.4	56.5	8.8	12.5	28.2	23.6	6.2	15.6	41.7	18.3	14.8	10.1	19.6
709	Meat meal.	29.5	28.5	31.4	1.9	46.9	7.3	9.8	24.0	18.7	6.6	12.5	30.5	16.7	12.5	9.1	14.5
710	Meat meal.	36.2	31.8	39.4	2.4	53.4	10.6	10.0	30.4	23.6	6.7	15.7	36.2	19.0	14.8	10.0	18.0
711	Meat meal.	31.2	29.0	37.3	3.0	49.2	8.6	9.9	25.3	22.7	6.4	13.4	32.8	16.5	13.3	8.8	14.7
731	Meat meal.	33.0	32.7	37.8	3.7	54.0	8.4	11.3	27.5	23.2	6.9	14.5	36.6	19.2	14.3	10.0	17.2
732	Meat meal.	30.9	27.8	36.0	3.0	48.2	7.7	9.5	24.6	21.0	6.4	12.8	32.5	16.4	12.9	8.7	15.0
733	Meat meal.	32.9	30.7	38.4	3.6	48.9	8.8	10.6	26.2	23.6	6.8	14.0	35.3	17.0	13.7	9.1	15.4
785	Meat meal.	33.7	32.8	38.1	3.2	53.8	8.5	11.7	28.6	22.5	6.7	15.2	37.4	19.5	15.1	10.3	18.1
786	Meat meal.	38.8	35.4	43.1	3.5	59.0	10.8	12.2	34.2	26.3	7.0	17.9	40.5	21.2	16.9	11.9	21.9
787	Meat meal.	32.7	30.3	36.8	3.1	49.6	8.0	10.3	25.5	21.7	6.5	13.7	36.0	16.5	13.1	9.0	16.1
812	Meat meal.	2.6	8.5	4.4	1.3	24.9	4.1	3.0	6.6	4.0	2.5	4.2	3.2	3.3	2.9	3.3	3.5
813	Meat meal.	36.4	36.1	41.9	3.0	55.7	9.9	11.8	28.6	25.6	6.9	15.4	40.4	18.3	14.7	10.1	18.9
699	Oats.	4.3	6.9	8.7	2.9	20.0	2.4	3.5	7.6	4.3	1.6	5.1	5.6	4.4	3.1	3.5	4.5
700	Oats.	4.7	6.7	8.7	6.1	19.3	2.2	3.7	7.7	4.3	1.6	5.2	5.4	4.4	3.3	3.4	4.8
701	Oats.	4.0	7.5	8.5	4.9	18.4	2.2	3.4	7.1	4.1	1.1	4.7	5.1	3.9	2.9	3.2	4.3
702	Oats.	4.9	7.4	9.8	9.1	22.3	2.6	3.9	8.4	4.9	1.9	5.6	5.8	4.8	3.5	3.7	5.3
703	Oats.	6.0	10.4	11.9	10.8	26.1	3.1	4.8	10.0	5.7	2.0	6.6	7.2	6.0	4.3	4.6	6.1
764	Oats.	4.5	7.4	8.8	2.4	22.3	2.6	3.5	7.8	4.4	1.6	5.2	5.2	5.0	3.3	3.5	4.4
774	Oats.	4.7	7.0	8.4	3.0	21.8	2.4	3.2	7.9	4.4	1.9	5.3	5.1	4.9	3.2	3.3	4.5
770	Oats.	3.7	5.6	6.9	2.1	16.9	2.1	2.6	6.3	3.7	0.9	4.2	4.3	4.4	2.6	2.7	3.5
760	Oats.	4.2	6.1	7.9	3.0	17.8	2.2	2.6	6.5	4.2	1.8	4.2	4.6	4.6	3.0	3.1	3.5
759	Oats.	4.6	6.8	8.6	3.1	20.9	2.3	3.1	7.6	4.2	1.6	4.9	5.4	5.1	3.2	3.4	4.1
771	Oats.	4.9	7.2	8.3	3.1	26.8	2.7	3.7	8.4	4.3	1.7	5.7	7.7	5.4	3.5	3.6	5.0
796	Rapeseed meal.	16.2	24.2	26.9	7.1	63.1	9.8	12.2	25.9	17.8	7.7	14.3	20.3	15.8	14.8	10.1	15.5
797	Rapeseed meal.	15.4	23.3	25.2	6.1	59.9	9.3	11.6	24.4	17.1	7.4	13.6	19.2	14.6	14.2	9.6	15.0
798	Rapeseed meal.	14.8	21.6	23.7	6.1	58.3	9.0	11.2	24.2	16.7	7.2	13.2	18.4	13.9	14.1	9.3	14.8
818	Rapeseed meal.	16.4	24.8	28.0	8.9	65.3	10.0	12.6	26.2	19.4	7.9	14.6	20.5	15.9	15.3	10.4	15.6
819	Rapeseed meal.	14.8	22.3	24.5	5.4	59.4	9.1	11.4	23.9	17.0	7.4	13.4	18.2	13.9	13.9	9.4	14.2
820	Rapeseed meal.	17.0	26.2	28.1	9.0	70.9	10.6	13.2	27.7	20.0	8.4	15.2	22.3	16.6	15.4	10.8	16.6
821	Rapeseed meal.	14.2	22.5	24.2	15.6	58.9	9.9	11.9	24.2	18.7	14.0	12.8	17.8	14.1	13.6	9.0	14.5
822	Rapeseed meal.	14.9	22.2	24.7	6.7	57.9	9.2	11.7	23.8	18.0	7.4	13.2	18.7	14.5	14.1	9.3	15.3
668	Rapeseed meal.	17.5	25.0	28.2	6.0	69.6	10.3	13.8	28.0	21.0	7.2	15.4	23.0	17.0	16.1	10.7	17.7
669	Rapeseed meal.	13.1	19.4	22.3	6.8	52.7	8.2	10.1	20.9	15.6	7.3	11.7	16.3	12.1	12.0	8.0	13.2
670	Rapeseed meal.	16.1	23.4	26.4	7.1	63.7	9.5	12.8	25.6	19.5	7.1	14.2	19.9	14.9	15.0	9.9	15.9
720	Rapeseed meal.	14.2	21.7	26.0	8.0	62.2	9.7	10.8	23.8	17.4	7.6	12.6	18.2	15.1	13.4	8.9	13.4

TABLE 3 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
721	Rapeseed meal.	13.6	19.6	24.3	7.2	58.4	9.1	10.1	22.5	17.2	6.4	11.8	17.5	14.3	12.9	8.7	12.3
722	Rapeseed meal.	13.8	21.4	25.1	7.1	59.5	9.2	10.4	23.1	16.9	6.3	12.4	17.4	14.5	13.2	8.5	12.3
743	Rapeseed meal.	14.0	21.3	26.1	7.4	60.2	9.4	11.2	23.3	18.1	7.1	12.4	18.1	14.9	13.7	9.2	14.0
744	Rapeseed meal.	14.5	22.5	25.9	8.7	66.3	10.0	11.6	24.4	18.3	9.4	13.0	19.2	15.1	13.4	9.0	14.0
745	Rapeseed meal.	12.6	18.6	22.5	7.5	53.7	8.8	10.2	21.2	16.0	7.7	11.4	16.2	13.0	12.1	8.3	12.4
746	Rapeseed meal.	14.5	22.8	26.7	8.6	66.3	9.8	11.5	24.5	18.3	8.1	13.2	19.2	15.1	13.7	9.2	14.3
747	Rapeseed meal.	15.0	22.9	26.8	8.8	68.2	10.3	11.9	24.9	18.2	8.1	13.8	19.0	15.3	13.7	9.4	14.6
641	Rice bran.	5.9	8.8	8.2	1.9	14.4	2.9	3.5	7.0	4.5	1.9	4.4	3.9	4.3	3.2	3.6	5.3
642	Rice bran.	7.0	11.0	8.6	1.8	14.4	3.0	3.6	6.7	4.7	2.7	4.8	4.3	4.9	3.6	3.5	5.8
647	Rice bran.	7.3	12.5	11.8	2.9	18.3	3.9	3.7	8.6	5.0	2.5	5.4	5.2	5.7	4.2	4.4	5.9
648	Rice bran.	7.4	7.9	10.6	2.3	16.3	3.4	3.6	8.4	5.7	2.6	5.2	5.1	5.9	4.4	4.1	5.7
644	Rice bran.	8.5	13.3	10.2	2.0	17.0	4.0	4.2	8.0	5.9	2.8	5.6	5.3	6.0	4.4	3.9	7.2
704	Screenings.	6.8	12.3	12.5	6.6	24.2	3.6	5.3	10.5	7.9	2.9	6.2	8.1	6.7	5.7	4.4	6.6
705	Screenings.	6.8	10.9	12.0	1.9	24.0	2.6	4.7	10.0	4.8	2.4	6.1	6.7	6.3	4.6	3.7	6.1
706	Screenings.	4.5	7.5	8.0	2.8	36.9	3.3	4.5	9.0	3.8	2.0	6.1	12.1	6.3	3.7	3.7	5.2
707	Screenings.	5.2	4.8	6.0	0.9	16.0	1.9	3.2	7.5	3.1	1.6	3.9	5.3	3.6	2.9	2.5	3.9
708	Screenings.	5.4	8.8	9.9	2.8	25.8	3.0	4.0	9.4	4.9	2.0	6.5	6.6	6.2	3.9	4.4	5.5
639	Sesame seed meal.	16.8	47.2	32.8	7.4	75.5	9.6	12.7	25.5	9.5	11.7	16.7	12.0	20.3	13.0	13.6	15.7
645	Sesame seed meal.	19.5	49.6	33.2	8.9	75.3	9.6	13.7	26.3	9.7	13.1	18.7	14.3	19.0	14.2	14.5	17.9
678	Shrimp meal.	21.1	23.3	34.6	3.8	46.3	9.1	14.8	23.1	20.9	8.6	132.3	16.2	19.9	16.5	23.5	18.6
840	Single cell protein.	46.1	31.3	63.9	3.6	66.0	12.3	28.6	48.0	39.5	15.0	23.6	19.6	21.8	30.0	20.5	34.2
671	Soybean meal.	19.5	37.0	57.3	6.5	88.4	12.6	18.7	35.9	28.2	7.0	23.9	24.0	25.2	18.1	16.7	19.4
672	Soybean meal.	20.1	36.2	57.6	6.6	89.2	12.7	18.6	36.4	28.2	7.3	23.9	24.3	25.4	18.2	16.6	19.2
673	Soybean meal.	24.6	44.0	69.4	7.6	106.9	15.4	24.4	45.3	35.6	8.2	29.6	29.5	31.2	22.6	20.7	27.0
723	Soybean meal.	19.9	36.2	58.0	6.5	91.8	13.6	18.1	37.0	30.7	7.0	23.7	24.5	26.5	18.6	16.3	18.1
724	Soybean meal.	20.1	36.5	57.7	7.4	91.8	13.4	19.6	37.4	30.7	7.7	23.8	24.1	26.7	18.6	16.4	18.9
748	Soybean meal.	19.4	34.8	57.6	7.3	91.3	12.9	16.2	35.4	29.5	7.7	22.5	24.0	25.8	17.8	15.8	15.3
749	Soybean meal.	17.8	30.1	54.1	7.3	84.9	11.7	14.6	32.8	26.2	7.5	20.7	21.7	23.7	16.5	14.4	14.7
750	Soybean meal.	20.4	35.7	59.7	8.4	94.6	13.1	16.9	36.5	30.5	8.0	23.3	24.9	27.1	18.7	16.6	17.4
751	Soybean meal.	19.3	32.0	57.8	7.9	92.0	12.4	16.5	35.3	28.4	7.1	22.6	23.5	26.1	18.1	15.9	16.9
799	Soybean meal.	22.6	38.6	61.2	7.0	98.4	13.7	21.0	41.2	32.0	7.7	26.4	27.4	28.0	20.3	18.3	22.0
800	Soybean meal.	22.8	40.2	62.4	7.3	103.9	14.1	21.3	42.0	33.0	7.8	27.4	28.4	29.4	20.4	19.2	21.6
801	Soybean meal.	21.9	38.0	58.7	7.3	96.7	13.4	20.3	39.8	31.5	7.9	25.9	26.7	27.5	19.6	18.6	21.0
802	Soybean meal.	21.7	41.5	62.6	7.1	98.3	14.2	21.4	40.5	32.2	7.9	26.3	27.2	28.4	19.6	18.8	21.7

TABLE 3 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
803	Soybean meal.	21.3	40.7	60.9	7.4	96.7	13.6	20.6	39.1	32.2	7.9	25.6	26.3	27.7	19.8	18.1	21.1
804	Soybean meal.	22.3	42.4	63.9	7.6	100.7	14.3	21.1	40.7	32.8	8.2	26.3	27.5	29.1	20.6	19.0	21.5
823	Soybean meal.	21.8	42.8	60.4	6.6	96.2	14.0	21.3	40.0	31.9	7.5	26.1	26.6	27.1	19.2	18.3	21.7
824	Soybean meal.	20.9	38.9	59.1	8.4	93.1	13.2	21.1	38.5	29.3	8.5	25.1	25.7	26.3	19.0	16.9	21.7
825	Soybean meal.	23.4	45.3	65.4	7.6	104.4	14.8	23.1	43.1	34.2	7.9	28.1	28.8	29.8	20.8	19.1	24.0
826	Soybean meal.	22.4	43.0	63.5	7.8	99.5	14.1	22.0	41.1	32.6	7.6	26.7	27.6	28.4	20.0	18.7	22.4
679	Wheat.	5.7	8.2	9.9	4.3	60.7	4.5	5.5	12.4	4.6	2.7	8.9	19.8	8.5	4.9	4.6	5.9
680	Wheat.	4.7	7.6	8.1	3.2	50.8	4.1	4.6	9.8	4.6	2.1	7.2	15.9	6.6	3.9	4.1	5.4
681	Wheat.	5.3	8.0	9.0	4.2	57.4	4.3	5.1	11.6	4.4	3.1	8.5	17.4	8.1	4.6	4.6	5.8
682	Wheat.	4.1	6.2	6.8	3.8	49.1	3.5	4.1	9.4	3.1	2.5	6.5	4.9	6.2	3.4	3.5	4.4
683	Wheat.	4.5	6.1	7.4	3.6	42.4	3.4	3.9	9.2	3.6	2.4	6.1	13.6	6.3	3.7	3.6	4.3
684	Wheat.	4.1	6.8	7.1	3.0	49.8	3.8	3.9	9.1	4.0	2.0	6.9	16.1	6.4	3.5	3.8	4.4
685	Wheat.	5.4	8.0	9.3	4.2	59.7	4.4	5.6	12.0	4.4	2.1	8.6	19.0	8.0	4.4	4.6	6.1
686	Wheat.	4.2	6.8	7.2	3.4	47.1	3.8	4.2	9.4	4.3	1.8	6.6	15.3	6.8	3.8	3.6	5.0
687	Wheat.	5.4	7.8	9.7	4.2	57.5	4.3	5.4	11.8	4.4	1.0	8.5	18.7	8.0	4.5	4.8	5.7
688	Wheat.	4.7	7.8	8.4	4.1	53.6	3.9	4.9	10.6	3.9	2.6	7.4	17.6	7.3	4.0	4.1	5.0
773	Wheat.	5.1	7.6	8.0	4.3	56.5	4.1	5.0	11.2	4.3	1.9	8.4	19.5	7.8	4.2	4.3	6.1
778	Wheat.	5.1	7.6	8.0	4.1	57.2	4.2	5.1	11.5	4.4	2.4	8.7	19.8	8.1	4.4	4.6	6.0
784	Wheat.	4.4	6.7	5.8	2.9	109.8	3.6	4.3	9.9	3.1	2.1	7.6	17.5	6.4	3.6	4.2	5.4
779	Wheat.	4.5	6.9	7.1	3.6	50.5	3.8	4.4	10.2	4.1	2.1	7.5	17.2	7.2	3.8	4.1	5.2
782	Wheat.	5.3	7.3	7.7	3.5	56.6	3.8	4.9	11.0	4.1	2.2	8.2	18.4	7.3	4.2	4.6	6.0
783	Wheat.	5.8	7.9	8.6	4.0	116.3	4.1	5.1	11.5	4.6	2.6	8.4	19.0	7.7	4.8	4.8	6.3
772	Wheat.	4.3	6.6	6.8	3.7	44.2	3.5	4.1	9.5	3.8	2.3	6.7	15.4	6.3	3.8	3.9	5.2
781	Wheat.	4.7	6.7	7.0	3.6	47.7	3.6	4.3	9.9	4.0	2.3	7.1	16.3	7.1	4.1	4.2	5.1
776	Wheat.	6.1	9.3	9.3	4.5	64.0	4.7	5.9	13.5	5.0	3.4	10.3	23.5	9.5	5.1	5.8	7.2
780	Wheat.	5.3	7.6	8.4	4.1	55.2	4.1	4.9	11.3	4.4	2.5	8.3	18.9	7.8	4.4	4.8	5.8
676	Wheat shorts.	7.6	12.1	11.8	3.4	35.2	4.7	4.9	10.4	7.2	2.3	6.6	11.1	6.4	5.2	4.7	6.9
677	Wheat shorts.	9.1	14.6	14.3	3.3	37.7	5.4	5.6	11.8	8.7	2.5	7.4	12.1	7.6	5.9	5.3	8.6
728	Wheat shorts.	6.3	10.6	9.7	2.6	30.7	4.0	4.1	9.0	5.8	2.2	5.8	9.9	6.6	4.4	4.3	5.9
729	Wheat shorts.	7.1	11.9	39.9	3.2	32.4	4.4	4.3	9.7	6.5	2.2	6.1	10.5	7.4	5.2	4.7	6.5
730	Wheat shorts.	6.1	10.6	9.8	3.2	30.6	4.0	3.9	8.9	5.6	2.1	5.7	10.0	6.6	4.5	4.1	5.7
756	Wheat shorts.	7.0	10.7	11.0	3.3	34.1	4.3	4.0	9.8	6.4	2.1	6.1	11.4	7.4	5.0	4.6	6.0
757	Wheat shorts.	6.7	10.5	10.4	3.6	34.7	4.0	4.0	9.5	6.2	2.2	6.0	11.5	7.1	4.6	4.6	5.6
758	Wheat shorts.	6.0	9.3	34.0	3.3	29.2	3.7	3.2	8.0	5.3	2.5	5.2	9.5	6.1	4.1	3.9	4.7
809	Wheat shorts.	7.2	12.1	10.2	2.9	32.1	4.1	4.6	10.3	5.6	2.7	6.5	10.9	5.9	4.3	4.6	6.8
810	Wheat shorts.	7.8	12.4	12.5	2.6	36.2	4.6	5.3	11.5	6.5	2.4	7.0	12.0	7.3	4.9	5.1	7.2
811	Wheat shorts.	7.5	13.0	11.4	2.9	33.2	4.4	5.0	10.3	6.6	2.8	6.6	11.3	6.9	5.1	4.6	7.5
832	Wheat shorts.	7.8	14.2	11.7	2.4	36.0	4.8	5.0	10.6	7.4	2.5	6.9	12.1	7.5	5.2	5.0	7.0

TABLE 3 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
833	Wheat shorts.	8.2	14.4	11.9	3.5	38.4	4.8	5.0	11.1	7.6	2.5	7.2	13.1	8.6	5.6	5.3	7.4
834	Wheat shorts.	8.2	14.8	12.3	3.3	36.8	4.9	5.0	11.0	7.7	2.7	7.2	12.6	8.0	5.4	5.2	7.5
835	Wheat shorts.	8.2	14.8	12.0	3.1	37.6	4.8	5.1	11.2	7.8	2.6	7.2	12.3	8.0	5.6	5.2	7.4
638	Yucca.	4.2	11.6	ND	ND	11.6	3.9	ND	6.2	7.9	ND	ND	ND	5.4	3.8	ND	ND
640	Yucca.	0.5	1.3	0.5	ND	2.1	0.4	ND	ND	ND	ND	ND	ND	0.3	0.2	ND	ND

[1] Blanks (-) = variable not measured; ND = variable not detected in a reportable amount.

TABLE 4

Bioavailability of amino acids in the dry matter of several feedingstuffs (%)[1,2]

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
655	Alfalfa.	66.1	76.6	77.0	30.1	66.6	63.4	72.1	73.9	61.2	77.4	75.3	83.7	64.8	64.3	66.5	72.0
656	Alfalfa.	81.3	87.7	84.0	-	82.0	74.6	85.0	86.4	54.8	-	85.7	86.4	76.9	78.9	82.8	81.3
653	Alfalfa.	81.1	86.6	84.1	44.5	82.7	73.4	83.8	84.5	77.5	83.1	84.3	85.9	75.6	76.8	79.4	81.8
839	Alfalfa.	74.1	70.5	71.7	54.1	62.3	68.4	68.4	70.5	57.7	62.1	71.1	66.6	60.3	62.0	64.7	65.5
657	Alfalfa.	72.8	83.2	82.5	27.0	74.4	80.2	76.4	78.9	51.5	73.3	78.8	82.4	73.5	75.2	73.5	76.3
652	Alfalfa.	80.6	91.0	84.5	40.2	83.7	83.8	83.3	86.2	61.2	79.2	81.8	89.9	78.7	80.9	85.3	83.4
654	Alfalfa.	71.3	79.1	80.7	51.4	71.4	74.2	72.6	76.5	46.1	68.2	76.0	74.4	67.5	69.3	71.3	72.0
649	Algae.	78.1	82.1	75.1	82.6	76.2	77.8	76.2	77.4	78.2	78.0	78.3	75.8	70.3	73.6	76.5	76.3
650	Algae.	86.7	92.1	85.7	83.8	87.7	86.9	86.2	88.3	86.8	88.7	88.4	84.4	81.2	82.3	87.1	85.8
689	Barley.	72.4	84.4	76.9	75.7	91.0	89.3	82.1	83.8	76.7	84.1	85.2	89.2	78.3	78.5	81.8	81.8
690	Barley.	75.7	85.5	78.2	95.3	92.1	87.7	83.9	88.2	74.9	81.1	89.1	94.0	88.0	78.6	88.5	81.6
691	Barley.	65.7	81.8	72.5	84.6	87.4	80.2	75.5	81.9	67.6	80.2	81.3	87.4	78.7	64.8	79.5	70.5
692	Barley.	73.2	83.8	75.9	88.9	91.0	85.7	80.6	85.9	72.6	79.6	87.3	92.4	82.7	75.0	85.1	78.8
693	Barley.	75.0	85.4	78.8	82.2	90.2	87.2	81.1	86.2	73.7	74.8	85.2	89.2	83.7	75.9	85.4	79.8
694	Barley.	79.8	90.7	85.7	97.8	93.5	90.4	87.4	91.5	82.2	82.8	91.4	95.1	94.0	81.9	94.0	85.4
695	Barley.	77.2	87.7	81.6	88.3	92.3	86.6	86.3	88.5	77.7	85.7	89.3	91.8	85.5	77.2	89.2	82.7
696	Barley.	76.4	87.1	80.7	91.3	92.4	89.4	83.6	88.1	78.1	29.5	89.2	93.5	90.4	79.6	90.0	82.7
697	Barley.	80.0	90.3	82.7	95.4	93.4	90.4	87.6	91.1	83.3	90.8	91.3	94.1	89.9	80.7	93.5	86.2
698	Barley.	78.2	90.9	82.8	80.6	93.9	92.7	86.1	88.0	81.5	83.8	91.8	94.0	83.3	81.9	88.3	83.8
769	Barley.	68.1	81.1	70.4	75.8	89.3	85.4	76.4	82.5	73.2	72.7	85.9	91.8	81.2	73.4	81.7	77.0
765	Barley.	76.4	83.3	77.3	70.0	90.4	87.1	82.3	85.5	84.2	80.1	86.9	84.8	79.5	76.0	86.0	83.5
762	Barley.	76.1	82.6	78.0	77.4	91.4	86.1	82.2	86.2	83.4	83.6	87.7	91.9	83.0	78.4	86.2	81.3
775	Barley.	71.1	79.5	72.5	71.5	87.7	79.3	76.1	81.6	78.0	77.3	84.5	89.2	76.7	71.2	81.0	78.8
777	Barley.	75.3	84.8	74.1	81.9	92.4	79.0	83.2	87.3	72.6	83.1	90.2	94.1	85.4	75.3	85.9	83.3
767	Barley.	63.5	73.4	67.9	62.3	84.8	82.0	71.2	76.5	73.7	74.9	78.6	83.0	64.9	67.2	76.3	69.3
768	Barley.	71.7	83.6	73.2	78.4	89.7	86.2	78.2	84.9	78.5	78.3	86.0	91.5	81.4	73.4	79.6	79.4
761	Barley.	70.5	79.4	74.4	86.3	89.4	85.6	74.3	82.3	75.8	76.1	84.4	91.8	83.5	76.5	82.5	75.4
763	Barley.	74.9	82.9	75.6	72.2	90.6	85.8	80.6	84.4	79.5	76.2	86.3	91.4	82.2	76.0	83.7	80.7
766	Barley.	80.4	85.2	79.6	73.5	92.9	88.9	85.3	88.1	86.1	80.4	90.4	92.5	81.5	78.6	87.3	83.6
666	Blood meal.	92.3	88.2	90.3	82.2	86.8	86.8	87.9	91.7	86.3	92.9	92.9	87.7	89.8	89.7	91.6	91.0
667	Blood meal.	95.4	91.2	94.6	81.4	90.3	91.5	84.3	94.6	88.9	95.6	95.4	92.1	94.3	93.3	93.9	94.6
717	Blood meal.	81.5	77.7	77.3	65.4	76.1	77.1	63.8	79.7	76.2	83.1	81.3	78.8	80.7	78.5	81.3	76.1
718	Blood meal.	92.3	87.3	88.9	74.9	87.3	88.6	81.3	91.1	87.3	91.5	92.3	85.0	88.2	87.5	90.2	89.4
719	Blood meal.	93.8	91.0	92.7	84.8	92.0	91.5	85.3	92.5	91.0	94.9	93.3	92.1	93.5	92.5	93.9	91.4
739	Blood meal.	86.4	80.4	84.4	76.3	80.0	81.6	67.7	85.3	76.3	87.9	86.7	85.8	85.9	83.4	86.0	82.3

TABLE 4 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
740	Blood meal.	92.8	88.1	89.3	75.8	88.1	88.1	82.2	91.0	89.9	92.6	92.5	86.8	89.8	88.1	91.5	89.4
741	Blood meal.	89.3	84.7	86.8	79.4	84.9	84.3	80.6	88.3	80.8	91.8	89.2	89.1	89.4	87.6	91.3	85.9
742	Blood meal.	93.9	84.1	92.3	78.3	87.6	88.3	78.1	93.0	81.7	94.1	94.1	93.0	92.4	90.5	91.9	91.7
792	Blood meal.	94.4	84.1	92.3	72.7	88.8	88.5	76.3	93.4	89.3	94.9	94.5	91.4	91.8	90.5	92.8	91.7
793	Blood meal.	93.5	89.2	90.8	78.0	89.1	88.5	84.2	92.2	89.5	92.2	93.5	88.2	90.9	89.3	92.3	90.6
794	Blood meal.	89.4	85.3	86.3	67.4	85.5	86.3	71.1	87.9	86.0	90.2	89.4	85.1	87.0	85.2	86.7	85.3
795	Blood meal.	87.3	83.0	84.2	70.4	83.6	84.6	71.1	86.5	82.3	87.5	88.1	85.0	86.4	84.1	87.8	83.2
817	Blood meal.	93.8	87.8	90.8	74.7	89.1	90.0	85.0	92.5	88.8	94.7	93.7	88.3	91.0	89.9	92.7	91.8
643	Coconut meal.	78.0	86.5	75.8	52.9	80.2	74.8	83.6	80.0	79.7	88.1	86.2	74.1	74.1	65.5	76.7	83.8
838	Corn.	97.0	95.9	97.1	97.0	98.1	96.8	99.5	98.6	103.1	100.5	97.8	97.1	96.8	93.5	98.3	97.6
853	Corn.	94.2	109.7	91.8	89.5	97.3	99.7	90.5	96.6	105.9	92.9	96.8	97.6	96.5	92.4	97.2	91.3
855	Corn.	92.2	100.5	88.5	80.5	94.9	98.6	86.8	94.2	107.8	92.6	92.4	94.1	87.4	85.0	93.0	87.7
856	Corn.	95.4	106.8	94.5	93.8	97.6	102.3	92.3	97.2	110.1	91.3	96.2	97.4	96.7	92.7	98.3	93.6
857	Corn.	96.2	107.0	94.7	94.7	98.2	103.6	93.4	97.3	113.1	94.5	96.8	98.5	96.6	95.1	97.3	93.0
858	Corn.	92.9	103.8	89.4	86.8	95.7	99.9	89.0	95.4	105.3	91.1	93.1	95.7	91.6	87.1	94.3	90.0
859	Corn.	90.5	100.0	82.2	83.8	92.9	96.4	84.9	93.9	93.0	86.8	91.1	94.0	87.2	83.6	91.4	87.4
860	Corn.	95.2	99.7	93.6	98.9	98.3	102.3	95.2	98.0	106.2	95.0	96.8	99.5	99.1	95.1	98.9	95.7
861	Corn.	94.6	97.6	90.7	90.7	96.4	97.1	89.7	97.0	93.7	93.3	96.2	96.7	95.5	89.5	96.3	89.6
862	Corn.	92.3	95.8	86.3	87.9	95.2	96.8	90.9	96.1	87.5	91.6	94.4	96.2	91.8	83.7	94.7	86.9
646	Corn germ meal.	85.8	90.3	77.5	57.8	86.8	83.7	86.2	87.2	83.0	85.6	88.0	81.5	80.3	78.6	83.5	85.6
651	Corn gluten feed.	91.3	89.1	82.1	77.3	91.7	86.7	87.3	93.1	75.1	89.4	91.4	90.4	87.2	81.1	90.2	86.8
674	Corn gluten feed.	91.8	92.8	85.9	73.1	92.0	89.1	90.3	93.2	80.9	87.7	91.5	88.7	88.7	84.6	90.2	90.6
726	Corn gluten feed.	81.6	85.9	72.8	61.9	83.7	81.2	77.1	86.3	65.8	78.0	83.0	83.6	81.0	70.9	80.0	79.1
727	Corn gluten feed.	81.5	86.0	70.9	62.3	83.6	81.5	76.7	86.1	65.6	79.6	82.8	82.8	80.2	72.1	81.4	78.7
754	Corn gluten feed.	85.9	86.3	77.2	67.4	86.7	83.3	80.0	89.2	68.7	85.0	85.6	86.0	81.9	75.3	86.9	83.0
755	Corn gluten feed.	86.1	85.3	76.5	65.1	85.7	81.9	81.0	88.9	72.6	85.4	86.7	84.1	80.6	73.6	84.7	81.5
805	Corn gluten feed.	89.7	91.8	81.8	61.3	90.8	87.5	89.4	92.9	74.3	88.2	90.8	89.0	87.7	81.5	89.8	89.8
806	Corn gluten feed.	84.9	87.8	75.4	54.0	86.2	82.8	83.0	88.6	71.2	84.6	85.6	83.5	80.7	75.1	83.5	82.6
827	Corn gluten feed.	88.4	90.5	80.7	59.9	89.1	87.6	86.0	90.8	69.4	85.1	87.8	87.2	85.5	78.8	87.2	88.5
828	Corn gluten feed.	86.0	92.1	75.5	62.0	85.9	84.8	78.3	88.9	75.8	84.9	85.8	83.4	80.6	75.5	84.9	79.4
675	Corn gluten meal.	98.9	98.3	96.9	90.6	98.8	96.4	98.1	99.1	94.8	98.5	98.9	98.2	97.5	95.5	98.4	97.9
725	Corn gluten meal.	97.1	94.3	93.7	91.5	97.5	95.0	94.7	98.0	84.9	97.4	97.0	97.0	95.7	92.2	96.6	94.1
752	Corn gluten meal.	97.4	92.4	94.2	89.0	97.5	94.2	94.9	98.0	88.5	97.5	97.3	96.4	95.5	92.7	97.0	94.8
753	Corn gluten meal.	97.7	95.6	95.0	88.9	96.3	94.2	95.7	97.8	92.7	97.9	97.8	97.4	96.3	93.9	97.6	95.5
807	Corn gluten meal.	97.5	94.4	93.0	82.2	97.3	93.7	95.8	98.1	85.6	97.1	97.4	96.9	95.4	91.9	97.1	95.5
808	Corn gluten meal.	97.2	93.8	92.6	80.8	97.2	93.9	95.8	98.0	85.7	96.2	97.3	97.0	95.3	91.6	96.8	95.5

TABLE 4 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MRT	PHE	PRO	SER	THR	TYR	VAL
829	Corn gluten meal.	97.2	97.8	93.3	85.0	97.1	95.0	94.9	97.8	88.6	96.2	97.2	97.1	95.1	91.8	96.8	94.8
830	Corn gluten meal.	96.3	97.4	92.3	84.5	96.2	94.3	93.4	96.9	86.5	96.5	96.2	96.3	95.0	91.4	96.0	93.3
831	Corn gluten meal.	97.1	98.2	93.9	85.5	97.4	94.9	94.8	97.7	89.0	96.4	97.0	97.3	95.8	93.1	96.8	94.7
663	Feather meal.	85.5	87.8	68.0	58.6	74.3	79.5	89.7	87.7	72.3	83.9	90.4	83.2	81.9	77.3	84.5	85.3
664	Feather meal.	81.3	83.5	54.7	47.1	63.9	68.0	85.9	83.5	58.7	74.5	87.0	79.5	82.9	70.4	78.8	82.6
665	Feather meal.	79.7	84.4	54.4	51.6	64.7	69.3	84.9	85.8	57.9	79.6	84.1	78.5	77.1	70.1	78.5	80.8
714	Feather meal.	75.4	77.5	54.1	50.5	63.0	71.7	79.7	78.9	61.4	73.7	82.7	63.6	73.7	66.7	74.3	74.5
715	Feather meal.	81.4	82.5	56.6	58.9	69.1	69.9	85.3	82.7	62.5	71.7	85.7	71.2	79.5	71.7	78.6	81.1
716	Feather meal.	77.7	82.8	55.8	51.2	68.3	70.4	82.9	80.2	65.4	72.1	82.5	69.6	78.2	70.1	77.3	78.0
737	Feather meal.	77.5	79.4	58.4	55.8	66.1	75.6	80.1	80.1	66.6	73.3	83.5	65.5	75.4	68.7	77.2	75.7
738	Feather meal.	80.2	83.1	58.4	66.4	70.0	70.4	85.2	82.3	63.9	76.2	85.4	70.6	79.3	73.2	79.2	80.4
790	Feather meal.	75.6	80.0	55.5	50.3	65.2	73.5	81.3	79.7	63.4	71.9	83.6	66.3	76.0	67.4	76.5	76.4
791	Feather meal.	84.8	88.1	68.6	65.0	77.0	75.3	88.2	86.6	72.7	78.0	89.4	78.4	84.0	79.4	84.7	85.0
815	Feather meal.	78.0	81.4	55.4	41.0	65.8	74.1	82.9	80.9	62.7	80.3	84.5	65.2	74.8	67.7	77.4	78.3
816	Feather meal.	84.8	86.6	64.2	60.9	74.2	77.2	89.7	86.6	67.7	73.9	89.3	76.0	82.7	76.3	82.9	85.2
662	Fish meal.	90.0	90.1	80.5	59.8	87.1	83.5	88.9	90.1	84.5	92.6	89.6	87.8	85.6	85.2	87.7	88.2
712	Fish meal.	89.6	91.3	86.5	71.5	90.5	88.4	89.6	91.3	88.3	93.0	89.7	89.1	89.5	89.7	91.5	88.6
713	Fish meal.	92.9	91.6	90.2	77.9	93.1	89.4	92.6	93.9	90.8	95.2	92.8	93.1	92.7	92.3	93.0	92.3
734	Fish meal.	92.6	89.6	91.2	77.3	93.3	88.9	92.8	94.5	88.4	95.2	93.2	90.6	91.6	91.6	93.8	92.9
735	Fish meal.	85.2	85.9	83.5	72.8	85.2	82.6	83.2	86.0	83.3	86.2	84.6	84.3	85.9	85.8	86.6	83.6
736	Fish meal.	90.5	91.6	88.2	78.7	90.3	87.8	90.3	91.7	89.8	92.5	90.3	87.7	90.9	91.0	91.1	89.3
788	Fish meal.	93.9	94.5	90.8	80.0	94.5	90.7	94.5	95.6	94.2	95.9	94.5	93.7	93.5	93.6	95.4	94.3
789	Fish meal.	94.4	92.1	91.2	81.1	94.4	90.3	94.3	95.3	89.4	96.1	94.8	94.0	93.5	93.1	95.1	94.2
814	Fish meal.	91.3	90.2	87.7	66.0	91.2	86.5	92.1	93.0	84.2	93.8	91.7	88.8	89.2	88.5	92.3	91.8
620	Fish meal.	91.4	94.2	88.1	76.1	92.9	90.5	94.3	94.2	89.8	94.1	93.1	90.0	90.3	91.4	93.9	93.9
621	Fish meal.	91.2	93.9	88.5	81.0	92.4	89.5	94.6	94.4	87.5	94.5	93.2	89.4	90.2	91.0	94.2	93.5
622	Fish meal.	93.0	95.2	90.5	84.1	94.4	90.4	95.2	95.4	90.7	92.7	94.4	92.3	92.8	92.7	95.6	94.0
623	Fish meal.	91.6	93.8	90.0	85.0	93.7	93.7	95.1	95.4	92.4	93.3	94.2	88.8	91.9	92.4	95.1	94.2
624	Fish meal.	91.6	94.2	89.7	82.4	93.1	93.1	95.0	95.1	91.4	92.3	94.2	89.1	91.4	92.7	95.1	94.0
625	Fish meal.	91.8	93.8	89.9	81.2	93.4	93.4	95.2	95.3	91.0	91.0	94.2	89.2	91.0	92.7	94.9	94.4
626	Fish meal.	90.5	94.0	86.0	74.5	91.0	88.6	94.0	93.8	86.6	89.8	92.6	90.5	89.4	90.1	94.0	93.4
627	Fish meal.	92.3	95.0	85.4	77.5	93.0	90.1	94.6	94.3	91.2	90.1	93.0	89.9	89.8	90.5	94.9	94.0
628	Fish meal.	93.7	95.8	88.1	76.6	94.1	91.1	95.2	95.0	91.2	90.4	94.2	93.0	91.2	92.4	95.2	94.9
629	Fish meal.	92.5	94.6	90.1	79.9	93.3	90.7	94.2	94.6	92.0	91.3	93.9	91.2	91.4	91.8	94.4	93.6
630	Fish meal.	93.5	95.9	90.0	80.5	93.8	89.6	94.6	94.9	88.7	91.9	94.0	92.7	92.0	92.7	95.1	94.3
631	Fish meal.	92.1	94.1	90.6	76.2	93.3	89.8	94.2	94.4	87.6	90.2	93.4	90.8	91.3	92.6	94.5	93.2
632	Fish meal.	93.0	94.5	89.0	75.2	93.1	91.1	93.1	93.8	88.3	89.2	92.8	92.7	90.3	91.6	93.3	93.3
633	Fish meal.	94.2	96.1	90.0	77.8	94.2	92.8	93.9	94.3	91.6	90.1	93.3	93.2	90.9	92.2	94.5	93.7
634	Fish meal.	94.1	95.8	90.5	77.4	94.1	91.3	94.1	94.5	86.8	89.8	93.5	94.4	91.9	92.6	94.4	94.0

TABLE 4 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
658	Meat meal.	89.2	92.3	82.0	61.5	88.1	87.6	90.8	91.1	84.6	91.7	91.2	88.1	86.4	86.9	90.8	90.6
659	Meat meal.	77.1	79.3	69.6	30.5	76.4	82.6	78.1	81.7	73.2	81.4	82.0	75.2	73.5	76.2	80.6	80.0
660	Meat meal.	84.8	86.8	82.8	56.9	84.4	86.3	84.3	86.7	83.0	89.4	86.3	82.7	80.6	83.8	84.4	84.6
661	Meat meal.	86.7	89.8	81.3	52.8	86.5	87.7	88.8	89.5	85.0	90.2	89.3	85.3	83.6	86.8	89.7	88.5
709	Meat meal.	82.2	86.0	72.7	37.7	80.9	80.5	81.3	84.1	77.0	87.2	83.5	79.2	78.6	80.0	83.8	80.0
710	Meat meal.	85.6	86.8	79.3	50.6	84.6	86.5	83.5	87.7	81.6	89.0	87.3	83.7	83.9	84.1	86.8	85.4
711	Meat meal.	83.2	84.4	83.2	64.0	84.9	86.4	84.4	87.4	84.6	89.7	86.3	81.2	83.3	84.3	86.6	83.9
731	Meat meal.	85.4	87.3	79.4	59.9	85.1	85.8	85.4	87.7	83.6	89.1	87.2	82.7	83.1	83.7	86.6	84.7
732	Meat meal.	83.3	82.2	81.1	53.3	83.6	84.3	82.2	85.9	82.0	87.8	85.0	81.0	80.7	82.7	84.4	82.8
733	Meat meal.	85.4	85.4	82.9	60.1	81.9	86.9	83.7	86.9	85.1	89.6	86.7	83.1	81.2	83.1	85.0	83.1
785	Meat meal.	88.2	89.7	83.4	56.2	87.4	88.5	87.5	90.0	85.1	89.1	89.3	87.4	86.2	86.3	88.6	87.6
786	Meat meal.	89.0	89.8	83.4	59.0	88.0	88.7	88.6	90.8	86.3	90.2	90.1	87.7	87.0	87.9	90.4	89.8
787	Meat meal.	86.0	86.2	84.2	59.3	86.1	86.2	86.3	88.7	84.8	90.5	87.3	84.1	83.7	84.8	88.2	86.9
812	Meat meal.	30.2	62.9	30.3	30.0	71.2	73.3	59.8	61.3	44.8	73.7	64.7	30.3	44.3	48.0	66.1	52.2
813	Meat meal.	89.3	87.7	86.1	54.0	87.3	89.9	86.2	88.2	86.3	90.8	88.1	89.2	85.1	84.5	87.3	88.1
699	Oats.	83.9	94.5	84.9	86.2	93.8	96.0	90.1	91.8	85.0	77.1	94.8	95.6	90.5	86.0	95.5	86.3
700	Oats.	88.8	98.7	89.1	95.1	96.2	96.8	93.0	95.0	88.6	89.7	97.4	95.8	94.1	90.2	100.8	91.1
701	Oats.	81.7	94.2	86.6	91.1	92.4	92.4	88.4	90.0	85.5	77.7	92.6	90.1	86.1	83.3	93.4	85.9
702	Oats.	89.9	99.3	94.7	95.1	98.2	101.7	94.3	95.6	94.5	89.6	97.4	95.1	94.1	93.2	99.1	92.4
703	Oats.	91.1	98.5	92.6	97.8	97.7	99.6	94.9	96.1	92.9	90.3	97.3	98.0	96.3	92.6	100.3	94.1
764	Oats.	77.2	88.3	81.7	65.6	90.1	88.6	83.8	86.2	82.1	83.3	88.3	83.2	81.0	76.7	85.9	80.4
774	Oats.	84.3	92.3	84.7	74.9	92.2	87.6	85.4	90.1	85.8	89.2	92.7	83.2	85.1	79.4	89.5	87.1
770	Oats.	78.7	92.9	80.9	77.0	90.5	89.0	83.3	88.5	82.4	80.3	91.5	89.0	87.1	79.0	88.3	83.9
760	Oats.	85.5	93.1	88.2	81.4	93.4	92.6	87.2	90.5	90.5	92.3	91.3	89.4	88.0	84.9	92.0	85.8
759	Oats.	84.3	91.4	85.6	83.0	93.2	85.7	87.2	91.2	83.6	88.1	92.1	90.7	89.0	81.9	93.7	88.0
771	Oats.	86.9	93.3	85.7	78.7	94.9	92.3	89.2	91.7	85.9	83.5	93.4	92.9	89.7	84.9	92.9	90.8
796	Rapeseed meal.	86.7	91.3	83.0	73.0	92.0	88.7	84.6	88.7	80.8	90.0	88.7	83.4	84.5	81.1	86.4	83.2
797	Rapeseed meal.	85.6	90.3	81.3	64.7	90.8	87.7	85.6	87.9	79.4	90.2	87.9	82.0	81.6	80.6	85.2	83.5
798	Rapeseed meal.	85.4	90.1	80.8	65.5	91.2	87.9	85.0	88.2	79.9	89.5	87.9	82.2	81.4	80.8	84.6	84.4
818	Rapeseed meal.	87.7	91.4	84.6	83.9	92.5	88.7	86.6	89.9	81.3	91.6	89.9	84.0	84.8	82.4	87.2	84.3
819	Rapeseed meal.	84.7	89.1	80.9	57.1	90.4	86.8	84.7	87.5	79.1	89.0	88.1	80.5	80.0	79.9	85.1	83.1
820	Rapeseed meal.	88.1	90.7	85.2	83.1	92.7	89.3	86.8	90.0	80.4	92.2	89.7	85.4	85.5	83.3	87.6	85.8
821	Rapeseed meal.	83.7	89.5	80.1	86.7	89.9	88.0	84.2	87.8	80.9	93.9	86.2	79.9	81.1	78.6	83.7	82.3
822	Rapeseed meal.	87.3	90.8	83.0	71.8	91.8	88.7	86.4	89.6	81.9	92.3	89.9	83.4	84.1	82.4	85.5	85.5
668	Rapeseed meal.	88.9	91.8	85.4	60.7	93.1	88.6	88.8	90.3	83.5	91.1	90.3	86.3	86.0	83.4	87.7	87.7
669	Rapeseed meal.	79.8	86.0	78.7	71.1	87.5	84.9	80.4	82.4	74.1	88.2	82.2	76.9	74.6	75.1	78.2	79.3
670	Rapeseed meal.	85.0	89.5	81.4	72.2	90.5	86.0	85.1	86.6	81.3	88.0	86.6	81.8	80.5	79.9	84.1	83.7
720	Rapeseed meal.	83.6	89.5	82.0	76.6	90.8	86.8	81.2	86.2	79.5	89.0	85.1	81.8	83.2	79.2	83.3	80.7

TABLE 4 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
721	Rapeseed meal.	84.5	88.2	82.6	74.9	91.3	88.4	82.6	88.1	79.9	88.2	86.4	82.3	83.7	79.9	83.7	80.8
722	Rapeseed meal.	83.9	89.9	81.9	73.8	90.9	88.0	82.0	86.9	80.3	87.7	86.2	82.0	83.2	80.6	82.9	79.4
743	Rapeseed meal.	86.5	90.3	84.5	74.2	92.3	88.6	84.7	89.0	81.8	90.6	88.1	82.8	85.4	81.7	85.6	83.0
744	Rapeseed meal.	84.9	89.3	83.2	76.2	91.6	88.0	83.5	87.9	81.1	90.9	87.0	83.3	84.7	79.6	83.9	81.8
745	Rapeseed meal.	82.4	89.4	80.2	79.8	90.3	86.9	81.8	86.7	78.0	93.3	86.3	79.6	81.2	77.7	82.3	79.6
746	Rapeseed meal.	85.5	90.8	84.7	79.0	92.3	88.2	83.9	88.6	81.6	91.8	87.9	83.0	84.5	81.9	85.1	83.1
747	Rapeseed meal.	84.8	89.1	82.7	77.6	90.8	88.7	83.1	87.2	78.4	90.2	87.1	81.3	83.4	79.4	84.7	82.2
641	Rice bran.	74.7	84.8	70.0	61.3	80.8	82.5	77.2	75.1	73.4	75.5	76.7	68.7	68.2	65.6	77.5	76.5
642	Rice bran.	73.5	84.8	64.9	55.3	77.0	73.9	72.5	67.4	66.8	77.7	70.6	63.5	68.2	63.1	74.6	72.8
647	Rice bran.	80.3	91.4	80.2	76.6	85.8	86.6	80.7	81.3	79.7	79.9	82.4	80.4	80.9	77.7	84.1	80.8
648	Rice bran.	76.9	82.7	72.1	63.6	79.3	81.8	74.8	75.0	80.7	72.6	75.3	73.6	74.9	71.5	77.3	74.4
644	Rice bran.	78.0	87.3	68.7	57.1	82.5	84.2	75.9	72.1	71.2	79.1	74.3	70.3	73.8	69.1	78.4	78.8
704	Screenings.	78.7	84.1	78.5	81.8	83.3	78.7	77.5	79.9	76.0	77.9	80.5	80.6	79.1	76.8	81.1	76.1
705	Screenings.	83.8	91.6	84.6	74.1	88.8	76.6	81.5	86.8	75.0	81.4	88.1	85.8	84.5	77.8	88.4	83.9
706	Screenings.	85.6	92.3	93.2	93.2	94.3	94.6	91.1	92.3	85.6	87.0	90.2	91.7	94.0	87.9	91.7	88.5
707	Screenings.	78.7	83.0	71.5	49.0	85.9	81.9	80.0	82.6	71.2	78.2	82.3	77.1	71.9	70.3	82.4	77.5
708	Screenings.	88.2	96.0	88.7	73.2	95.7	95.8	91.7	93.9	88.7	87.7	95.4	92.4	92.6	86.1	94.6	92.2
639	Sesame seed meal.	86.2	90.6	85.7	78.2	92.9	87.2	90.1	89.6	84.0	92.1	91.3	86.9	89.5	84.8	90.5	88.7
645	Sesame seed meal.	92.3	94.2	90.8	85.2	95.0	91.4	93.8	92.6	91.2	96.1	95.1	92.0	91.7	89.1	94.0	93.2
678	Shrimp meal.	89.9	93.5	87.4	78.6	88.3	91.0	95.1	95.2	90.0	96.2	99.1	89.3	87.2	91.1	93.9	93.5
840	Single cell protein.	90.9	94.6	89.5	66.9	91.1	90.1	92.4	91.8	89.0	88.7	92.9	88.2	87.6	88.6	91.5	90.0
671	Soybean meal.	88.1	93.8	92.7	83.9	94.3	92.6	92.0	91.7	88.0	92.0	92.8	92.6	92.3	89.5	92.8	90.5
672	Soybean meal.	89.6	92.8	93.3	85.1	94.7	93.0	92.9	92.6	87.7	93.8	93.6	93.0	92.3	89.9	93.1	91.5
673	Soybean meal.	91.6	94.0	94.1	87.4	95.7	93.6	94.8	94.1	92.2	94.0	95.0	94.8	94.0	91.2	94.9	94.2
723	Soybean meal.	87.3	90.7	91.7	81.9	93.6	92.7	89.6	90.9	89.9	89.8	91.7	93.3	92.0	87.9	91.9	88.0
724	Soybean meal.	90.6	93.5	93.6	86.9	95.6	93.9	93.0	93.8	91.8	93.2	94.3	95.1	94.8	91.1	94.5	91.9
748	Soybean meal.	88.3	89.9	90.9	81.8	93.1	91.0	89.1	90.5	89.3	91.6	91.3	91.2	90.2	86.5	91.7	86.4
749	Soybean meal.	87.1	85.9	91.2	81.3	93.3	88.9	87.7	90.1	84.7	92.3	90.9	90.5	89.1	85.8	91.1	85.6
750	Soybean meal.	91.6	92.3	93.6	88.7	95.4	92.8	92.5	93.4	92.2	94.7	93.8	93.9	93.6	91.2	94.2	92.3
751	Soybean meal.	90.2	87.4	93.5	87.8	95.0	90.7	91.6	92.5	87.8	92.6	93.0	93.4	92.7	90.3	93.5	89.9
799	Soybean meal.	90.7	90.4	92.6	78.4	94.7	91.9	93.0	93.2	89.8	92.2	94.0	94.4	93.3	90.3	94.0	92.3
800	Soybean meal.	89.7	90.0	91.4	77.8	94.3	90.9	92.1	92.1	88.6	92.3	93.0	93.1	92.0	88.1	92.9	90.9
801	Soybean meal.	89.7	90.4	91.5	78.2	94.2	91.2	92.2	92.1	89.1	92.0	93.5	93.6	92.4	88.7	93.7	90.9
802	Soybean meal.	89.0	92.7	92.2	77.9	94.5	93.5	93.1	92.6	90.0	91.3	93.7	94.6	92.8	88.6	93.8	92.2

TABLE 4 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
803	Soybean meal.	89.3	91.3	91.4	77.8	94.1	91.9	92.1	91.9	90.9	92.8	93.0	92.6	92.1	88.6	93.4	91.0
804	Soybean meal.	91.2	92.0	93.1	79.0	95.6	93.4	93.8	93.7	90.8	93.7	94.4	94.9	93.7	90.8	94.6	92.6
823	Soybean meal.	89.3	93.1	91.6	75.0	93.6	92.8	91.6	91.5	89.3	92.9	92.8	92.8	91.3	88.0	93.2	90.3
824	Soybean meal.	92.1	90.6	93.8	87.6	95.4	92.7	94.3	94.1	86.3	95.0	94.7	95.7	94.1	92.3	94.7	93.8
825	Soybean meal.	90.4	92.2	92.7	79.2	94.6	92.0	92.8	92.7	89.4	93.6	93.6	93.8	93.1	90.1	93.9	92.2
826	Soybean meal.	90.8	91.9	92.7	84.2	94.8	92.5	93.1	92.9	89.7	93.5	93.9	94.3	92.9	89.8	93.9	92.7
679	Wheat.	87.4	95.8	88.1	95.3	97.9	94.6	92.0	95.1	82.9	89.3	95.7	98.7	96.2	88.9	95.3	90.3
680	Wheat.	79.5	87.8	84.5	84.3	95.9	94.3	87.9	88.5	80.2	88.9	90.4	93.6	84.5	81.0	85.9	85.5
681	Wheat.	86.0	91.8	86.7	92.2	97.5	93.2	90.0	93.7	83.7	91.6	94.7	97.6	93.6	86.9	94.6	88.6
682	Wheat.	72.2	80.7	73.1	86.7	94.4	85.9	80.8	84.9	64.4	85.7	87.0	79.6	82.1	71.6	80.9	76.8
683	Wheat.	86.2	92.4	86.4	93.7	97.4	92.1	89.8	94.0	81.2	90.7	94.7	98.3	94.4	86.6	95.7	87.8
684	Wheat.	72.4	84.6	76.6	81.1	94.7	91.3	82.4	84.9	72.4	81.6	88.0	93.4	82.8	76.6	81.4	80.0
685	Wheat.	80.3	86.0	81.9	90.2	96.0	89.7	87.3	89.9	76.4	85.0	91.5	95.7	89.6	80.9	88.9	84.7
686	Wheat.	78.0	89.9	84.0	87.7	95.8	95.3	88.7	90.1	80.6	84.5	91.4	95.3	90.1	85.0	86.8	87.3
687	Wheat.	88.0	94.3	89.5	98.1	98.1	93.1	93.3	96.0	84.0	80.9	96.6	99.2	97.9	89.5	97.6	91.5
688	Wheat.	79.3	87.7	80.6	87.3	95.9	88.3	87.5	90.2	78.6	88.7	91.8	95.9	89.1	79.2	89.0	83.8
773	Wheat.	80.9	86.7	81.9	86.1	96.0	90.8	87.7	90.2	84.4	83.4	92.7	95.8	89.6	81.7	87.5	86.3
778	Wheat.	82.9	89.1	83.6	90.7	96.8	94.0	89.1	91.6	86.9	87.7	93.8	97.4	92.7	86.2	90.0	87.9
784	Wheat.	68.9	78.4	62.8	69.1	96.5	84.1	77.5	82.5	61.8	76.2	86.7	92.1	80.1	71.6	81.9	76.6
779	Wheat.	79.6	86.6	79.8	84.9	95.6	91.2	85.7	89.5	84.2	83.9	91.7	95.6	89.6	80.8	87.6	84.4
782	Wheat.	84.9	88.4	83.7	84.6	96.8	92.1	89.5	92.2	85.2	86.4	93.8	96.4	91.2	84.3	91.5	87.4
783	Wheat.	89.9	92.2	90.1	92.7	99.1	95.3	93.2	95.0	92.6	90.8	95.5	98.3	95.7	92.6	95.5	91.3
772	Wheat.	82.5	88.9	82.3	87.8	96.2	92.1	87.4	91.1	85.1	86.3	92.4	96.8	90.4	85.4	90.1	88.2
781	Wheat.	83.6	87.7	84.2	86.5	96.4	91.6	90.0	91.7	86.1	88.7	92.8	95.7	91.1	85.9	91.7	87.7
776	Wheat.	84.2	90.3	84.0	88.1	96.7	90.0	89.7	92.2	84.3	90.0	94.6	97.4	92.1	84.5	91.8	88.5
780	Wheat.	86.6	88.0	86.3	89.7	97.2	92.9	91.7	92.9	87.2	92.0	94.5	97.0	91.5	87.0	93.6	89.3
676	Wheat shorts.	83.5	87.9	83.0	80.5	93.0	87.5	88.0	87.4	83.2	83.8	88.1	90.5	83.2	82.8	87.5	85.9
677	Wheat shorts.	83.2	89.4	84.0	75.2	92.0	87.2	87.7	87.0	84.8	81.6	87.5	90.5	84.3	81.5	86.4	87.3
728	Wheat shorts.	75.8	84.1	76.5	63.3	89.6	82.7	78.4	81.6	78.4	75.4	83.2	87.6	82.0	75.4	83.2	78.1
729	Wheat shorts.	77.1	84.7	93.3	73.0	90.1	82.4	79.9	82.7	77.9	77.8	83.0	88.9	84.6	78.9	85.2	80.3
730	Wheat shorts.	73.4	83.5	75.5	73.8	88.7	80.7	76.8	80.7	75.0	76.1	81.4	87.7	81.7	74.7	80.5	77.4
756	Wheat shorts.	83.7	85.9	82.8	73.0	93.2	87.3	84.0	87.0	84.9	76.3	87.4	92.8	88.0	83.9	87.9	84.3
757	Wheat shorts.	76.9	82.0	76.6	76.0	90.2	80.2	78.1	81.9	78.2	80.5	82.8	89.1	81.7	75.1	83.3	75.9
758	Wheat shorts.	74.0	78.7	90.9	70.6	88.0	78.8	73.7	78.0	75.4	82.9	80.1	86.0	77.6	72.1	79.7	72.5
809	Wheat shorts.	76.3	82.5	73.6	58.9	87.9	76.4	81.6	82.3	68.0	79.4	82.8	87.6	76.8	70.4	81.4	80.6
810	Wheat shorts.	79.8	84.3	80.3	59.2	90.5	83.0	84.4	85.1	78.0	80.7	85.8	89.4	81.8	76.2	85.6	82.2
811	Wheat shorts.	80.5	86.8	80.3	64.1	91.0	84.0	86.2	85.6	78.3	81.8	86.8	90.6	84.0	80.2	85.0	85.5
832	Wheat shorts.	81.2	92.0	80.7	52.9	91.6	87.1	83.3	84.6	87.8	77.1	86.4	91.6	84.4	80.0	86.3	82.1

TABLE 4 cont.

Code	Description	ALA	ARG	ASP	CYS	GLU	HIS	ILE	LEU	LYS	MET	PHE	PRO	SER	THR	TYR	VAL
833	Wheat shorts.	81.9	90.9	81.2	75.3	92.4	86.0	84.1	85.8	87.6	78.9	87.6	94.3	89.3	83.0	88.3	84.1
834	Wheat shorts.	83.0	92.3	82.5	71.0	92.5	88.0	84.5	86.2	88.7	81.1	88.6	94.3	87.6	82.1	87.9	85.0
835	Wheat shorts.	81.9	91.3	81.6	69.3	92.4	85.8	84.3	86.5	88.5	79.8	88.0	93.0	87.4	82.0	88.2	84.6
638	Yucca.	77.0	91.5	-	-	82.2	86.6	-	80.7	83.2	-	-	-	75.1	72.8	-	-
640	Yucca.	62.1	97.8	51.6	-	86.0	89.9	-	66.0	69.0	-	-	-	62.6	36.4	-	-

[1] Data of Table 3 expressed as percentages of data of Table 2.

[2] Blanks (-) = variable cannot be calculated.

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